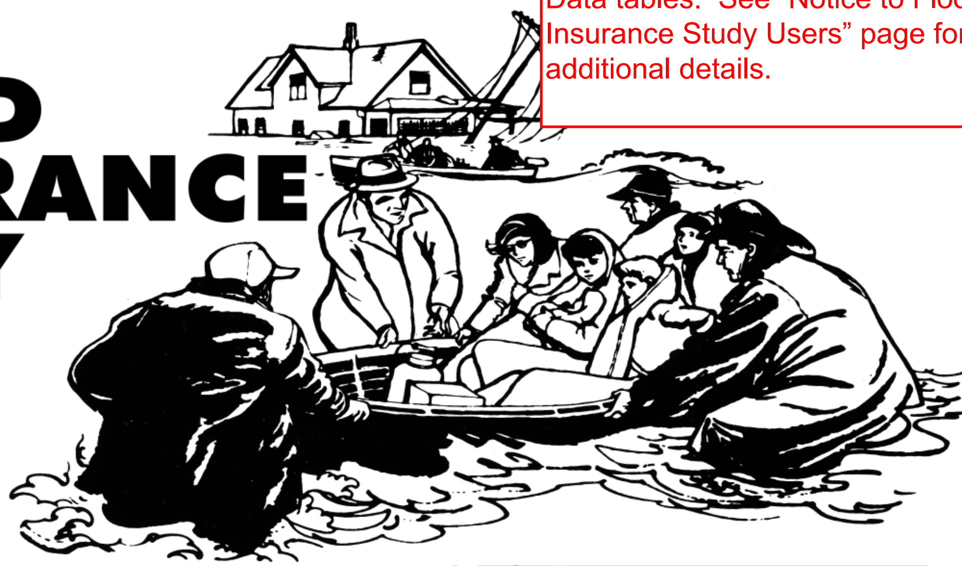
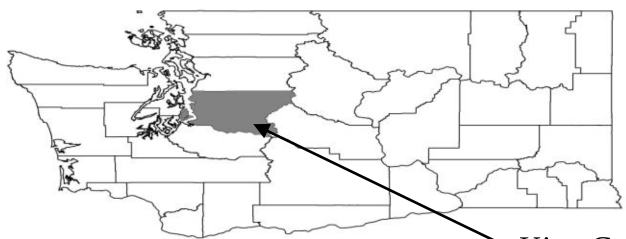
Notice

This preliminary FIS report includes only revised Flood Profiles and Floodway Data tables. See “Notice to Flood Insurance Study Users” page for additional details.

FLOOD INSURANCE STUDY



KING COUNTY, WASHINGTON AND INCORPORATED AREAS



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COMMUNITY NAME	COMMUNITY NUMBER
*ALGONA, CITY OF	530072
AUBURN, CITY OF	530073
*BEAUX ARTS VILLAGE, TOWN OF	530242
BELLEVUE, CITY OF	530074
BLACK DIAMOND, CITY OF	530272
BOTHELL, CITY OF	530075
BURIEN, CITY OF	530321
CARNATION, CITY OF	530076
*CLYDE HILL, CITY OF	530279
COVINGTON, CITY OF	530339
DES MOINES, CITY OF	530077
DUVALL, CITY OF	530282
ENUMCLAW, CITY OF	530319
FEDERAL WAY, CITY OF	530322
*HUNTS POINT, TOWN OF	530288
ISSAQUAH, CITY OF	530079
KENMORE, CITY OF	530336
KENT, CITY OF	530080
KING COUNTY, UNINCORPORATED AREAS	530071
KIRKLAND, CITY OF	530081
LAKE FOREST PARK, CITY OF	530082
*MAPLE VALLEY, CITY OF	530078
*MEDINA, CITY OF	530315
*MERCER ISLAND, CITY OF	530083
MUCKLESHOOT INDIAN RESERVATION	530165
NEWCASTLE, CITY OF	530134
NORMANDY PARK, CITY OF	530084
NORTH BEND, CITY OF	530085
PACIFIC, CITY OF	530086
REDMOND, CITY OF	530087
RENTON, CITY OF	530088
SAMMAMISH, CITY OF	530337
SEATAC, CITY OF	590320
SEATTLE, CITY OF	530089
SHORELINE, CITY OF	530327
SKYKOMISH, TOWN OF	530236
SNOQUALMIE, CITY OF	530090
TUKWILA, CITY OF	530091
WOODINVILLE, CITY OF	530324
*YARROW POINT, TOWN OF	530309

*No Special Flood Hazard Areas Identified

PRELIMINARY:

Federal Emergency Management Agency

Flood Insurance Study Number
53033CV002B

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone(s)	New Zone
Al through A30	AE
V1 through V30	VE
B	X
C	X

Initial Countywide FIS Effective Date: September 29, 1989

Revised Countywide Date(s): May 16, 1995
May 20, 1996
March 30, 1998
November 8, 1999
December 6, 2001
April 19, 2005
To Be Determined

This preliminary FIS report does not include unrevised Floodway Data Tables or unrevised Flood Profiles. These Floodway Data Tables and Flood Profiles will appear in the final FIS report.

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EXHIBIT (continued)

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EXHIBIT (continued)

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Exhibit 1 – Flood Profiles (continued)

PUBLISHED SEPARATELY

3.3 Wave Height Analysis

This section outlines the technical approach used to simulate waves and water levels in the Puget Sound (King County) and Puget Sound (Vashon Island. Waves in sheltered waters are typically generated by local conditions, so the processes are less complex than open coastal settings. The primary processes affecting waves and water levels in sheltered waters include wind, astronomic tides, tidal residuals (i.e. differences between observed and predicted tides), currents, and tidal wave amplification. Within the study area, the potential effect of currents is negligible, so they were not included in offshore wave modeling. Furthermore, preliminary analyses with the wave model showed that rising and falling tides had no amplifying effect on waves so this factor could also be ignored.

The two-dimensional numerical model SWAN (Simulating WAves Nearshore, Version 40.41) was used to simulate wave generation, including shoaling effects.

For this study, historical wind data was obtained from 19 gages located throughout the Puget Sound region. The length of record at these stations varies greatly, and most of the records contain large gaps, so it was difficult to find periods when data from most or all of the gages were available. The gage at SeaTac International Airport has hourly wind data from 1948 to 2009 with very few gaps, so it was chosen as the primary source of wind data for this study. However, since wind speed and direction are not uniform over the study area, the other 18 gages were used to define spatial variability. These secondary gages were correlated with the SeaTac gage for this purpose as described below.

Figure 1 is a profile for a hypothetical transect showing the effects of energy dissipation on a wave as it moves inland. This figure shows the wave elevations being decreased by obstructions, such as buildings, vegetation, and rising ground elevations and being increased by open, unobstructed wind fetches. Actual wave conditions may not necessarily include all of the situations shown in Figure 1.

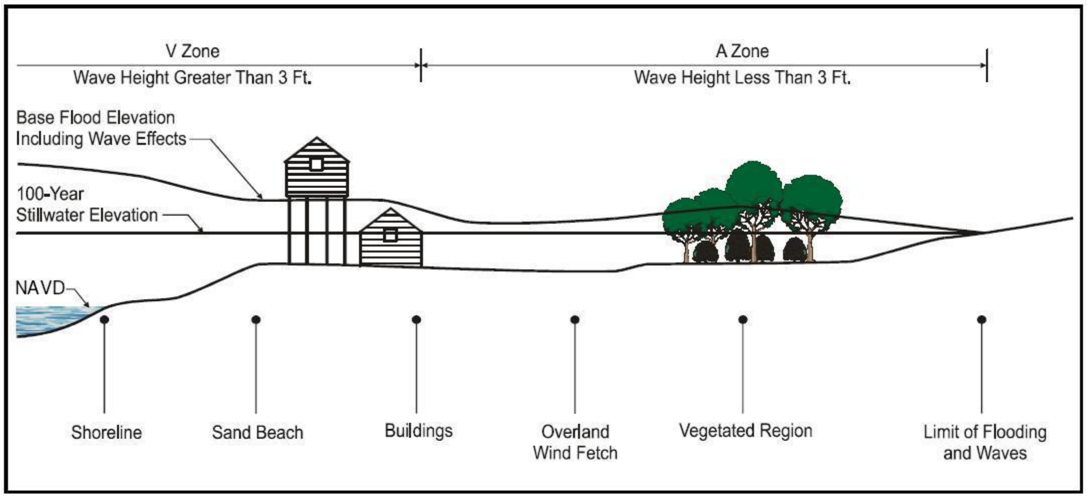

Figure 1 - Transect Schematic

3.4 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

To accurately convert flood elevations for the streams in King County from the current NGVD29 datum to the newer NAVD88 datum, the following procedure was implemented. Locations at the upstream and downstream end of the stream, as well as a point to represent the intermediate point between the two end points, were evaluated using the

USACE's CORPSCON (Reference 133) datum conversion software. The resulting values for each of the three points were the computed difference between the NGVD29 and NAVD88 elevations. Individual conversion factors at the upstream end, the downstream end, and at an intermediate point, were averaged to develop an average conversion; these factors can be seen in Table 5, Datum Conversion Factors. The final NAVD88 elevations provided were computed by adding the calculated factor to the existing NGVD29 data (References 1-18).

Table 5. Datum Conversion Factors

Stream	Upstream	Middle	Downstream	Vertical Adjustment (feet)
Bear Creek	3.64	3.60	3.58	3.61
Big Soos Creek	3.57	3.56	3.52	3.55
Black River	3.58	3.52	3.49	3.53
Cedar River	3.56	3.56	3.56	3.56
Coal Creek	3.62	3.61	3.58	3.60
Des Moines Creek	3.52	3.53	3.49	3.51
East Fork Issaquah Creek	3.65	3.62	3.60	3.62
Evans Creek	3.59	3.59	3.58	3.59
Forbes Creek	3.59	3.59	3.59	3.59
Gardiner Creek	3.67	3.61	3.61	3.60
Green River	3.58	3.52	3.49	3.53
Holder Creek	3.65	3.61	3.58	3.61
Issaquah Creek	3.58	3.64	3.60	3.61
Issaquah Creek (Gilman Overflow)	3.58	3.64	3.60	3.61
Kelsey Creek	3.58	3.58	3.57	3.58
Kelsey Creek (West Trib)	3.58	3.58	3.58	3.58
Kelsey Creek (East Branch)	3.58	3.58	3.58	3.58
Little Bear Creek	3.63	3.62	3.62	3.62
Longfellow Creek	3.55	3.56	3.56	3.56
Lower Overflow	3.62	3.61	3.61	3.61
Lyon Creek	3.63	3.63	3.62	3.63
McAleer Creek	3.63	3.63	3.62	3.63
Maloney Creek	4.05	4.05	4.05	4.05
May Creek	3.61	3.59	3.57	3.59
May Creek Tributary	3.60	3.60	3.60	3.60
Mercer Creek	3.57	3.57	3.57	3.57
Mercer Creek (North Branch)	3.57	3.57	3.57	3.57
Mercer Creek (Right Channel)	3.57	3.57	3.57	3.57
Meydenbauer Creek	3.57	3.56	3.56	3.56
Meydenbauer Creek (North Fork)	3.57	3.56	3.56	3.56
Middle Fork Snoqualmie River	3.67	3.61	3.61	3.63
Middle Overflow	3.61	3.60	3.60	3.60
Mill Creek - Auburn	3.52	3.51	3.51	3.51
Mill Creek - Kent	3.53	3.53	3.53	3.53
Miller Creek	3.55	3.53	3.48	3.52
North Creek	3.62	3.62	3.62	3.62
North Fork Issaquah Creek	3.60	3.59	3.59	3.59
North Fork Snoqualmie River	3.67	3.63	3.62	3.64
North Fork Thornton Creek	3.62	3.62	3.61	3.62
Patterson Creek	N/A	N/A	N/A	3.58
Raging River	3.61	3.60	3.62	3.61
Richards Creek	3.59	3.59	3.58	3.59
Richards Creek (West Trib)	3.59	3.59	3.58	3.59
Richards Creek (East Trib)	3.59	3.59	3.58	3.59
Rolling Hills Creek	3.63	3.59	3.59	3.60
Sammamish River	3.57	3.60	3.62	3.60
Snoqualmie River	3.61	3.57	3.60	3.59
South Fork Skykomish River	4.08	4.02	3.93	4.01
South Fork Snoqualmie River	3.63	3.59	3.59	3.60
South Fork Thornton Creek	3.61	3.61	3.61	3.61

Table 5. Datum Conversion Factors

Stream	Upstream	Middle	Downstream	Vertical Adjustment (feet)
Springbrook Creek	3.54	3.54	3.55	3.54
Swamp Creek	3.63	3.62	3.62	3.62
Thornton Creek	3.61	3.60	3.59	3.60
Tibbetts Creek	3.61	3.61	3.61	3.61
Tolt River	3.62	3.59	3.57	3.59
Upper North Overflow	3.61	3.60	3.60	3.60
Upper South Overflow	3.60	3.60	3.61	3.60
Vasa Creek	3.62	3.61	3.60	3.61
Walker Creek	3.50	3.49	3.49	3.49
West Fork Issaquah Creek	3.60	3.60	3.60	3.60
White River	3.53	3.53	3.51	3.52
Yarrow Creek	3.59	3.58	3.58	3.58
<u>Stillwater Source</u>				
Lake Sammamish	NA	NA	NA	3.6
Puget Sound	NA	NA	NA	3.5

Flood elevations shown in this FIS report and on the DFIRM are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242
(301) 713-4172 (fax)

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the DFIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and DFIRM for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods except Bear Creek, Des Moines Creek, Little Bear Creek, Miller Creek, North Creek, Sammamish River, Swamp Creek, Walker Creek and White River, except, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:240, 1:1,200, 1:2,400, 1:4,800, and 1:6,000, with contour intervals of 1, 2, 4, 5, and 10 feet (Reference 46 and 63 to 78).

For Puget Sound the 1-percent-annual-chance floodplain boundaries were interpolated using 2 foot contours (Reference, 192).

For Bear Creek, Des Moines Creek, Little Bear Creek, Miller Creek, North Creek, Sammamish River, Swamp Creek, Walker Creek and White River, the topography used to delineate the 1- and 0.2-percent–annual-chance floodplain boundaries are unknown.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, and VE); and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

Approximate 1-percent-annual-chance floodplain boundaries in some portions of the study area were taken directly from the Flood Hazard Boundary Maps (References 79 to 89), or Flood Insurance Rate Maps (References 90 and 91).

The base flood elevation (BFE) is the water surface elevation for the 1%-annual-chance event. BFEs are the greatest elevation between the "with levee" and "without levee" (discussed in Section 3.2.5.9) simulations. The elevation difference between the two simulations is negligible due to the ineffectiveness of the overbanks in conveying flow. Users should be aware that the BFEs shown on the work maps represent rounded whole-foot elevations and may not exactly reflect the elevations presented on the Flood Profiles (Exhibit 1) or in the Floodway Data Table (Table 6). The BFEs shown on the work maps are primarily intended for illustrative purposes. For construction and/ or floodplain management purposes, users are cautioned to refer to the elevation data presented in the Floodway Data Table as well as the Flood Profiles in conjunction with the data illustrated on the work maps.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

A Regulatory Floodway was delineated for the Lower Green River using the HEC-RAS and FLO-2D models. In general, the floodway was developed to coincide with the effective Green River floodway to the greatest extent possible. The HEC-RAS model was run to determine if the effective floodway could fully contain the 1-percent-annual-discharge flood without causing surcharges in excess of one foot relative to the "fail all levee" condition. In areas where the one-foot surcharge could not be achieved, the overbank portions of the floodway were delineated using the FLO-2D model as described above in Section 3.2.8.2. Encroachments in the overbank areas were manually defined until a reasonable floodway boundary was established. Floodway widths were computed at each cross-section in the HEC-RAS model and the delineation between section were drawn based on topographic information. At some cross-sections, the floodway boundary coincides with the top of the channel banks and the channel does not encroach into the channel. The floodway along the certified levee near Southcenter (i.e., the Tukwila 205 Levee) was delineated along the landward toe of the levee fill. In locations where the floodway and the 1,-percent-annual-discharge floodplain boundary coincide, only the floodway boundary is shown. Floodway data is not provided for portions of the floodway that were analyzed using FLO-2D.

The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross section (see Table 6, Floodway Data). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway is shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation (WSEL) of the base flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BEAR CREEK								
A	0.03[1]	90	577	2.7	35.3	34.9[3]	35.9	1.0/0.0[4]
B	0.45[1]	239	652	2.4	40.2	40.2	40.6	0.4
C	0.66[1]	267	1,292	1.2	41.2	41.2	41.6	0.4
D	0.74[1]	310	1,244	1.2	41.6	41.6	41.9	0.3
E	0.83[1]	370	1,375	1.1	42.1	42.1	42.4	0.3
F	38[2]	69	377	4.1	44.5	44.5	45.1	0.6
G	1,455[2]	154	659	2.3	46.9	46.9	47.4	1.0/0.0[4]
H	2,523[2]	160	895	1.7	49.7	49.7	50.3	1.0/0.0[4]
I	3,563[2]	590	2,311	0.7	49.9	49.9	50.6	0.9/0.1[4]
J	4,655[2]	747	2,090	0.7	50.0	50.0	50.8	1.0/0.0[4]
K	6,764[2]	415	709	1.6	51.5	51.5	52.4	0.9/0.1[4]
L	7,664[2]	33	159	6.7	52.6	52.6	53.6	1.0/0.0[4]
M	8,525[2]	100	530	2.0	56.9	56.9	57.9	1.0/0.0[4]
N	10,232[2]	35	262	4.1	60.3	60.3	61.1	0.8/0.2[4]
O	11,575[2]	200	703	1.5	62.0	62.0	63.0	1.0/0.0[4]
P	13,713[2]	118	691	1.4	66.2	66.2	67.2	0.9/0.1[4]
Q	16,016[2]	125	596	1.7	70.7	70.7	71.4	0.7/0.3[4]
R	19,048[2]	91	423	2.4	77.7	77.7	78.7	1.0/0.0[4]
S	20,277[2]	66	297	3.4	83.7	83.7	83.8	0.1/0.9[4]
T	21,325[2]	80	414	2.4	85.3	85.3	86.0	0.7/0.3[4]
U	21,980[2]	55	341	2.9	86.5	86.5	87.3	0.8/0.2[4]
V	23,059[2]	45	278	3.6	89.6	89.6	90.2	0.7/0.3[4]
W	23,930[2]	100	486	2.1	91.6	91.6	91.8	0.3/0.7[4]
X	25,253[2]	85	236	2.2	94.9	94.9	95.4	0.6/0.4[4]
Y	5.54[1]	34	179	2.9	97.8	97.8	98.6	0.8
Z	5.67[1]	41	176	3.0	100.8	100.8	101.5	0.7

[1]Miles Above Mouth

[2]Feet above State Route 202

[3]Elevation Computed Without Consideration of Backwater Effects From Sammamish River

[4]Surcharge Over Base Conditions/Available Surcharge

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BEAR CREEK (CONTINUED)								
AA	5.81	38	189	2.8	103.9	103.9	104.4	0.5
AB	5.94	48	144	3.5	106.4	106.4	106.7	0.3
AC	5.98	44	128	3.9	107.6	107.6	107.7	0.1
AD	6.02	81	270	1.9	108.7	108.7	108.8	0.1
AE	6.21	96	230	2.2	113.8	113.8	114.4	0.6
AF	6.41	69	255	2.0	122.0	122.0	122.5	0.5
AG	6.45	20	122	4.1	122.6	122.6	123.1	0.5
AH	6.45	20	102	4.9	122.6	122.6	123.2	0.6
AI	6.49	79	313	1.6	123.8	123.8	124.2	0.4
AJ	6.63	84	235	1.8	125.6	125.6	126.2	0.6
AK	6.75	76	189	2.3	128.3	128.3	128.8	0.5
AL	6.90	30	129	3.3	130.9	130.9	131.7	0.8
AM	6.97	71	197	2.2	132.3	132.3	133.3	1.0
AN	7.03	83	283	1.5	133.2	133.2	134.2	1.0
AO	7.20	81	244	1.8	136.8	136.8	137.8	1.0
AP	7.23	31	122	3.5	137.4	137.4	138.3	0.9
AQ	7.23	31	139	3.1	137.7	137.7	138.6	0.9
AR	7.29	49	143	3.0	139.4	139.4	140.0	0.6
AS	7.37	29	107	4.0	142.0	142.0	142.3	0.3
AT	7.42	47	212	2.0	143.0	143.0	143.5	0.5
AU	7.60	23	56	7.3	146.4	146.4	146.7	0.3
AV	7.67	34	105	3.9	150.5	150.5	151.3	0.8
AW	7.76	42	140	2.9	153.8	153.8	154.1	0.3
AX	7.84	33	121	3.4	155.9	155.9	155.9	0.0
AY	7.88	9	36	11.4	158.5	158.5	158.5	0.0
AZ	7.94	27	140	2.4	162.4	162.4	162.9	0.5

[1]Miles Above Mouth

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BEAR CREEK (CONTINUED)								
BA	8.10	39	92	3.6	165.1	165.1	166.0	0.9
BB	8.16	19	76	4.4	168.4	168.4	168.5	0.1
BC	8.16	19	85	3.9	168.8	168.8	168.9	0.1
BD	8.21	46	149	2.2	169.9	169.9	170.1	0.2
BE	8.34	29	74	4.5	174.4	174.4	174.9	0.5
BF	8.54	44	130	2.5	183.9	183.9	184.0	0.1
BG	8.70	84	262	1.3	186.6	186.6	187.1	0.5
BH	8.87	86	177	1.7	189.2	189.2	190.2	1.0
BI	8.97	56	69	4.5	198.0	198.0	198.2	0.2
BJ	9.04	23	94	3.3	204.6	204.6	204.6	0.0
BK	9.08	43	76	4.1	206.4	206.4	206.5	0.1
BL	9.18	23	73	4.2	215.4	215.4	215.4	0.0
BM	9.31	87	166	1.9	222.2	222.2	222.3	0.1
BN	9.40	95	168	1.8	225.6	225.6	225.6	0.0
BO	9.55	114	142	2.2	232.9	232.9	232.9	0.0
BP	9.61	34	99	3.1	235.6	235.6	235.6	0.0
BQ	9.65	38	124	2.5	236.7	236.7	236.8	0.1
BR	9.76	36	101	2.9	239.9	239.9	240.4	0.5
BS	9.85	44	130	2.2	243.1	243.1	243.3	0.2
BT	9.98	64	234	1.2	244.1	244.1	244.6	0.5
BU	10.09	54	199	1.5	244.8	244.8	245.6	0.8
BV	10.13	20	83	2.8	245.3	245.3	246.1	0.8
BW	10.14	20	79	2.9	245.6	245.6	246.3	0.7
BX	10.17	34	111	2.1	246.4	246.4	247.0	0.6
BY	10.23	31	118	1.9	248.6	248.6	249.1	0.5
BZ	10.32	30	103	2.2	250.0	250.0	250.7	0.7

[1]Miles Above Mouth

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BEAR CREEK (CONTINUED)								
CA	10.49	51	127	1.8	255.1	255.1	255.5	0.4
CB	10.64	47	132	1.7	258.8	258.8	259.1	0.3
CC	10.69	44	162	1.4	259.4	259.4	259.9	0.5
CD	11.02	45	188	1.2	261.8	261.8	262.7	0.9

[1]Miles Above Mouth

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
EVANS CREEK								
A	0.35	39	137	2.9	53.0	53.0	53.9	0.9
B	0.81	190	136	2.1	59.9	59.9	60.4	0.5
C	1.21	90	197	1.7	66.1	66.1	66.9	0.8
D	1.41	354	557	1.3	66.8	66.8	67.6	0.8
E	1.67	69	322	1.8	68.3	68.3	68.7	0.4
F	1.89	200	407	1.4	68.3	68.3	69.0	0.7
G	2.26	45	192	2.6	70.9	70.9	71.1	0.2
H	2.28	32	181	3.3	71.0	71.0	71.2	0.2
I	2.55	80	248	2.1	75.7	75.7	76.1	0.4
J	2.73	56	126	4.3	76.1	76.1	77.1	1.0
K	2.93	19	114	3.5	78.5	78.5	79.2	0.7
L	3.08	38	270	2.5	79.4	79.4	80.1	0.7
M	3.25	40	84	5.3	79.9	79.9	80.5	0.6
N	3.67	18	51	7.8	82.6	82.6	83.0	0.4
O	3.99	262	248	2.6	89.0	89.0	89.7	0.7
P	4.35	220	137	2.2	96.2	96.2	96.2	0.0
Q	4.41	207	90	1.8	98.7	98.7	98.7	0.0
R	4.79	120	56	3.6	105.3	105.3	105.6	0.3

[1]Miles above confluence with Bear Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

EVANS CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
LITTLE BEAR CREEK								
A	40	39	289	1.7	27.7	27.4[2]	27.4	0.0
B	177	8	78	6.4	29.2	29.2	29.2	0.0
C	427	14	97	5.2	30.0	30.0	30.3	0.3
D	577	24	70	7.1	29.9	29.9	30.6	0.7
E	617	19	52	9.6	30.9	30.9	30.9	0.0
F	764	39	182	2.7	36.9	36.9	37.0	0.1
G	849	31	102	4.9	36.9	36.9	37.0	0.1
H	949	49	124	4.4	37.4	37.4	37.5	0.1
I	1,059	55	247	2.3	39.9	39.9	39.9	0.0
J	1,159	44	179	3.2	40.1	40.1	40.1	0.0
K	1,199	50	194	2.9	40.1	40.1	40.1	0.0
L	1,224	31	137	4.1	40.1	40.1	40.1	0.0
M	1,413	26	157	3.6	41.8	41.8	41.8	0.0
N	1,493	31	183	3.1	41.9	41.9	42.0	0.1
O	1,773	32	109	5.2	42.1	42.1	42.2	0.1
P	1,979	11	51	11.0	46.4	46.4	46.8	0.4
Q	2,103	24	174	3.3	49.3	49.3	49.3	0.0
R	2,792	20	104	5.4	51.9	51.9	52.7	0.8
S	3,642	34	130	4.4	57.3	57.3	57.7	0.4
T	4,602	38	89	6.4	64.5	64.5	64.9	0.4
U	5,122	28	129	4.4	68.0	68.0	69.0	1.0
V	5,962	24	94	6.0	72.9	72.9	73.5	0.6
W	6,652	45	303	1.8	84.5	84.5	84.5	0.0
X	7,052	24	111	4.8	84.7	84.7	85.2	0.5
Y	7,452	36	175	3.1	87.2	87.2	88.2	1.0
Z	7,762	23	148	3.6	94.3	94.3	94.3	0.0

[1]Feet above mouth

[2]Elevation Computed Without Consideration of Backwater Effects from Sammamish River

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
LITTLE BEAR CREEK (CONTINUED)								
AA	8,162	27	150	3.6	94.8	94.8	95.8	1.0
AB	9,522	21	73	7.4	104.5	104.5	105.3	0.8
AC	10,562	23	136	4.0	114.0	114.0	114.6	0.6
AD	10,742	46	247	2.2	114.5	114.5	115.1	0.6

[1]Feet above mouth

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MILLER CREEK								
A	40	31	140	4.8	14.0	9.9[3]	9.9	0.0
B	518	171[2]	361	1.9	14.0	11.9[3]	12.0	0.1
C	973	211	301	2.2	14.0	12.9[3]	13.6	0.7
D	1,586	15	59	8.1	19.2	19.2	19.2	0.0
E	1,916	17	82	5.8	21.2	21.2	22.1	0.9
F	3,016	23	59	8.1	34.2	34.2	34.3	0.1
G	3,391	17	62	7.8	39.8	39.8	39.8	0.0
H	3,867	54	54	8.9	46.8	46.8	46.8	0.0
I	4,109	24	76	5.6	49.7	49.7	49.7	0.0
J	4,579	25	60	7.2	59.9	59.9	59.9	0.0
K	6,494	24	67	6.4	105.2	105.2	105.2	0.0
L	8,984	22	57	5.2	161.6	161.6	161.6	0.0
M	9,428	12	58	5.1	172.9	172.9	173.9	1.0
N	10,248	19	70	3.9	191.9	191.9	192.1	0.2
O	10,603	37	136	2.0	195.6	195.6	195.7	0.1
P	11,028	17	67	4.1	196.3	196.3	196.4	0.1
Q	11,869	22	72	7.4	201.1	201.1	201.1	0.0
R	12,572	14	61	4.5	207.5	207.5	207.5	0.0
S	12,759	76	111	2.5	210.1	210.1	210.2	0.1
T	13,314	13	78	2.7	215.6	215.6	216.0	0.4
U	13,434	12	69	3.1	216.3	216.3	216.5	0.2
V	13,960	16	32	6.6	218.0	218.0	218.5	0.5
W	14,861	19	48	4.4	227.2	227.2	227.9	0.7
X	15,461	18	47	4.5	233.3	233.3	233.5	0.2
Y	16,006	11	37	5.8	239.4	239.4	240.0	0.6
Z	16,202	42	169	1.2	250.9	250.9	250.9	0.0

[1]Feet above Puget Sound

[2]Computed Without Consideration of Walker Creek Floodway

[3]Computed Without Consideration of Backwater Effects From Puget Sound

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

MILLER CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MILLER CREEK (CONTINUED)								
AA	16,837	13	43	4.9	254.4	254.4	254.4	0.0
AB	17,415	28	70	3	12.6	12.6	13.6	1.0
AC	17,801	20	78	2.7	19.2	19.2	19.2	0.0
AD	18,062	13	59	3.6	21.2	21.2	22.1	0.9
AE	18,982	335	973	0.2	34.2	34.2	34.3	0.1
AF[2]								

[1]Feet above Puget Sound

[2]Floodway not computed

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

MILLER CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
NORTH CREEK								
A	0	65[3]	412	3.9	26.3	25.2[2]	25.2	0.0
B	275	44	276	5.8	26.3	25.4[2]	25.4	0.0
C	660	79	332	4.3	26.3	26.0[2]	26.0	0.0
D	1,088	95	604	2.4	26.6	26.6	26.7	0.1
E	1,706	90	516	2.8	26.9	26.9	27.5	0.6
F	2,220	250	846	1.7	27.2	27.2	28.0	0.8
G	3,085	436	1,071	1.3	28.2	28.2	28.9	0.7
H	3,765	514	1,604	0.9	28.5	28.5	29.4	0.9
I	4,625	35	149	9.8	30.9	30.9	31.0	0.1
J	4,874	72	484	6.2	33.4	33.4	33.4	0.0
K	5,234	235	778	2.3	34.6	34.6	34.6	0.0
L	5,689	46	279	6.2	34.9	34.9	34.9	0.0
M	6,059	96	460	3.7	36.9	36.9	36.9	0.0
N	6,274	79	397	4.3	37.7	37.7	37.7	0.0
O	6,796	114	662	2.6	39.8	39.8	39.8	0.0
P	7,556	546	3,655	0.5	40.6	40.6	40.6	0.0
Q	8,571	111	703	2.4	41.4	41.4	41.4	0.0
R	8,886	74	590	3.2	42.6	42.6	42.6	0.0
S	9,764	159	747	2.3	46.6	46.6	46.6	0.0

[1]Feet above confluence with Sammamish River

[2] Elevations Computed Without Consideration of Backwater Effects from Sammamish River

[3] The floodway shown on the FIRM has been widened beyond this value to account for Sammamish River floodway

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

NORTH CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
SAMMAMISH RIVER								
A	1,115	289	1,836	2.9	18.9	18.9	19.7	0.8
B	3,327	175	1,433	3.7	19.8	19.8	20.4	0.6
C	6,577	123	1,157	3.8	20.9	20.9	21.3	0.4
D	8,297	103	1,076	4.1	21.4	21.4	21.8	0.4
E	10,547	115	1,214	3.6	22.4	22.7	22.7	0.3
F	14,042	132	1,275	3.4	23.6	23.8	23.8	0.2
G	15,874	132	1,352	3.2	24.1	24.3	24.3	0.2
H	19,365	133	1,384	3.2	25.4	25.5	25.5	0.1
I	21,431	118	1,164	3.8	25.8	25.9	25.9	0.1
J	26,646	124	1,185	2.8	27.1	27.2	27.2	0.1
K	30,064	116	1,202	2.4	28.1	28.1	28.1	0.0
L	32,937	123	1,166	2.4	28.6	28.7	28.7	0.1
M	36,161	114	1,251	2.3	29.4	29.4	29.4	0.0
N	40,414	108	1,231	2.2	30.3	30.3	30.3	0.0
O	42,296	131	1,291	2.1	30.6	30.6	30.6	0.0
P	45,243	122	1,242	2.2	31.1	31.1	31.1	0.0
Q	49,406	111	1,252	2.2	31.8	31.8	31.8	0.0
R	53,592	120	1,191	2.2	32.6	32.6	32.6	0.0
S	55,445	159	1,495	1.7	33.0	33.1	33.1	0.1
T	58,387	112	1,240	2.1	33.8	33.8	33.8	0.0
U	60,742	132	1,312	2.0	34.4	34.4	34.4	0.0
V	62,852	126	1,382	1.9	34.8	34.9	34.9	0.1
W	66,582	114	1,146	1.4	35.4	35.5	35.5	0.1
X	67,559	107	1,077	1.5	35.5	35.5	35.6	0.1
Y	68,847	268	2,450	0.7	35.7	35.7	35.8	0.1
Z	70,402	159	1,221	1.4	36.1	36.1	36.3	0.2
AA	71,647	524	2,459	0.7	36.2	36.2	36.4	0.2

[1]Feet above confluence with Lake Washington

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

SAMMAMISH RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
SWAMP CREEK								
A	960	50	232	3.9	20.6	19.8[3]	19.8	0.0
B	1,400	47	240	3.8	20.9	20.6[3]	20.6	0.0
C	1,870	147	652	1.4	25.0	25.0	26.0	1.0
D	2,300	45	294	3.1	25.2	25.2	26.2	1.0
E	2,491	84	374	2.4	26.0	26.0	26.8	0.8
F	2,791	26	191	4.8	26.3	26.3	26.9	0.6
G	3,271	28	214	4.3	27.1	27.1	28.0	0.9
H	3,860	54	283	3.2	28.3	28.3	29.2	0.9
I	4,461	413	1,330	0.7	28.9	28.9	29.9	1.0
J	5,151	302	419	2.1	30.5[2]	29.7	30.7	1.0
K	5,661	530	834	1.0	34.0[2]	31.9	32.9	1.0
L	6,271	286	275	3.2	35.6[2]	34.6	35.5	0.9
M	6,961	467	865	1.0	39.7[2]	38.0	39.0	1.0
N	7,561	37	95	9.1	43.9[2]	43.1	43.1	0.0
O	7,941	59	223	3.9	46.3[2]	46.3	47.2	0.9
P	8,141	47	192	4.5	47.9	47.9	48.5	0.6
Q	8,181	66	186	4.7	48.3	48.3	48.6	0.3
R	8,931	242	397	2.2	53.3	53.3	53.7	0.4
S	9,631	33	93	9.4	56.5	56.5	56.6	0.1
T	9,961	295	351	2.5	60.6	60.6	61.5	0.9
U	10,231	75	143	6.1	62.7	62.7	63.2	0.5
V	10,791	48	172	5.1	67.9	67.9	68.9	1.0
W	11,381	55	144	6.0	75.0	75.0	75.0	0.0
X	12,031	28	176	4.9	78.9	78.9	79.8	0.9
Y	12,791	57	169	5.1	84.0	84.0	84.3	0.3

[1]Feet above confluence with Sammamish River

[2]Elevation Computed for Flow Confined to Main Channel Between Sections I and N

[3]Elevations Computed Without Consideration of Influence from Sammamish River

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

SWAMP CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WALKER CREEK								
A	290	132	217	5.0	14.5	14.5	14.9	0.4
B	510	134	482	2.2	15.7	15.7	16.6	0.9
C	710	254	809	1.3	16.1	16.1	16.9	0.8
D	920	35	98	4.7	16.4	16.4	17.1	0.7
E	1,100	34	106	4.3	17.7	17.7	18.2	0.5
F	1,160	7	35	9.0	19.6	19.6	20.6	1.0
G	1,200	20	97	3.2	19.8	19.8	20.8	1.0
H	1,410	20	49	5.8	20.6	20.6	21.5	0.9
I	1,600	20	37	7.7	25.4	25.4	25.5	0.1
J	1,720	15	50	5.7	27.2	27.2	28.1	0.9

[1]Feet above confluence with Miller Creek

[2]Because of Map Scale Limitations, All Floodway Widths Less Than 30 Feet Are Shown As 30 Feet

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

WALKER CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WHITE RIVER								
AN	113,629	523/398[2]	2,068	7.5	587.9	587.9	587.9	0.0
AO	114,469	224/101[2]	1,457	10.6	594.0	594.0	594.0	0.0
AP	115,339	307/133[2]	1,641	9.5	601.8	601.8	601.9	0.1
AQ	116,229	198/119[2]	980	14.3	607.3	607.3	607.3	0.0
AR	117,617	454/362[2]	1,261	11.1	617.2	617.2	617.3	0.1
AS	119,439	192/85[2]	972	14.4	630.5	630.5	630.5	0.0
AT	121,076	225/91[2]	910	14.3	644.6	644.6	644.6	0.0
AU	122,818	235/87[2]	1,122	11.6	657.1	657.1	657.1	0.0
AV	124,339	242/138[2]	1,010	12.9	666.6	666.6	666.6	0.0
AW	126,535	184/58[2]	1,055	12.3	685.6	685.6	685.9	0.3
AX	128,906	259/44[2]	1,160	11.2	701.4	701.4	701.4	0.0
AY	132,840	752	1,965	6.6	729.9	729.9	730.0	0.1
AZ	136,013	248	1,524	8.5	750.6	750.6	751.2	0.6
BA	138,663	930/874[2]	1,937	7.6	771.3	771.3	771.4	0.1
BB	141,393	368/292[2]	1,922	6.8	793.2	793.2	793.2	0.0
BC	144,007	137/75[2]	1,268	9.7	810.4	810.4	810.8	0.4
BD	146,425	99/77[2]	856	14.4	827.1	827.1	828.1	1.0
BE	150,459	132/116[2]	802	15.4	872.6	872.6	872.6	0.0

[1]Feet above confluence with Puyallup River

[2]Total width/ width within county

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

WHITE RIVER

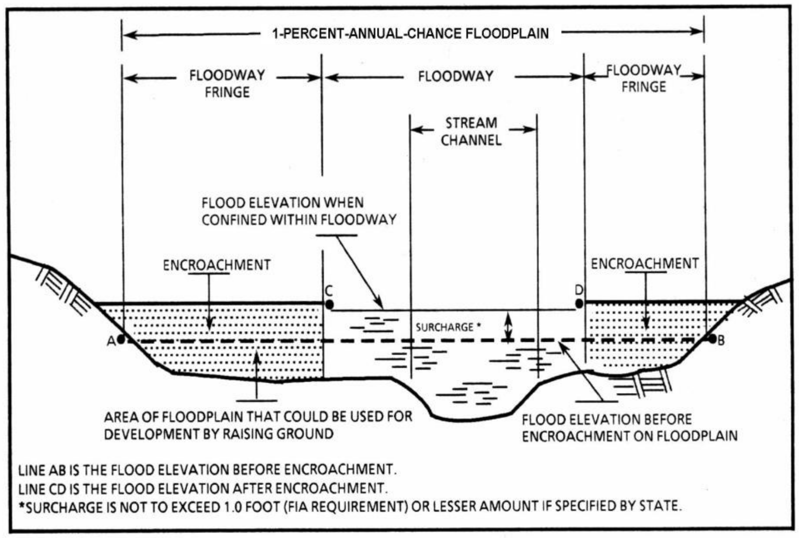

Figure 2. Floodway Schematic

4.3 Base Flood Elevations

Areas within the community studied by detailed engineering methods have BFEs established in AE and VE Zones. These are the elevations of the 1-percent-annual-chance (base flood) relative to NAVD. In coastal areas affected by wave action, BFEs are generally maximum at the normal open shoreline. These elevations generally decrease in a landward direction at a rate dependent on the presence of obstructions capable of dissipating the wave energy. Where possible, changes in BFEs have been shown in 1-foot increments on the FIRM. However, where the scale did not permit, 2- or 3-foot increments were sometimes used. BFEs shown in the wave action areas represent the average elevation within the zone. Current program regulations generally require that all new construction be elevated such that the first floor, including basement, is elevated to or above the BFE in AE and VE Zones.

4.4 Velocity Zones

The USACE has established the 3-foot wave height as the criterion for identifying coastal high hazard zones (Reference 191). This was based on a study of wave action effects on structures. This criterion has been adopted by FEMA for the determination of VE zones. Because of the additional hazards associated with high-energy waves, the NFIP regulations require much more stringent floodplain management measures in these areas, such as elevating structures on piles or piers. In addition, insurance rates in VE zones are higher than those in AE zones.

The location of the VE zone is determined by the 3-foot wave as discussed previously. The detailed analysis of wave heights performed in this study allowed a much more accurate location of the VE zone to be established. The VE zone generally extends inland to the point where the 1-percent-annual-chance stillwater flood depth is insufficient to support a 3-foot wave.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base (1-percent-annual-chance) flood elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile (sq. mi.), and areas protected from the base flood by levees. No BFEs or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied be detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide DFIRM presents flooding information for the entire geographic area of King County. Previously, DFIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide DFIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 7, "Community Map History."

7.0 OTHER STUDIES

Due to its more detailed hydraulic analyses, this FIS supersedes all previous FISs/FIRMs covering King County and the incorporated areas (References 1-18, 90-92). The Town of Milton has individual effective FIS (Reference 93).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, FEMA Region X, Federal Regional Center, 130 228th Street Southwest, Bothell, Washington 98021-8627.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Algona, City of[1]	NA	NA	NA	NA
Auburn, City of	May 24, 1974	September 19, 1975 February 18, 1977	June 1, 1981	
Beaux Arts Village, Town of[1]	NA	NA	NA	NA
Bellevue, City of	August 2, 1974	August 13, 1976	December 1, 1978	February 23, 1982
Black Diamond, Town of	July 25, 1975	October 30, 1979	October 30, 1979	None
Bothell, City of	May 24, 1974	November 12, 1976	June 1, 1982	March 2, 1994
Burien, City of	September 30, 1994	None	September 30, 1994	May 16, 1995
Carnation, City of	May 31, 1974	March 5, 1976	March 4, 1980	None
Clyde Hill, Town of[1]	NA	NA	NA	NA
Covington, City of	TBD	None	TBD	None
Des Moines, City of	June 28, 1974	January 2, 1976	May 15, 1980	November 15, 1985
Duvall, Town of	August 20, 1976	None	June 4, 1980	None
Enumclaw, City of	September 29, 1989	None	September 29, 1989	None
Federal Way, City of	May 16, 1995	None	May 16, 1995	None
Hunts Point, Town of[1]	NA	NA	NA	NA
Issaquah, City of	February 8, 1974	February 25, 1977	May 1, 1980	None
Kent, City of	June 7, 1974	April 22, 1977	April 1, 1981	None
Kenmore, City of	TBD	None	TBD	None
King Unincorp Areas	January 17, 1975	None	September 29, 1978	None
Kirkland, City of	June 28, 1974	September 12, 1975	June 15, 1981	None
Lake Forest Park, City of	June 28, 1974	February 27, 1976	February 15, 1980	None
Maple Valley, City of[1]	None	None	None	None
Medina, City of[1]	NA	NA	NA	NA
Mercer Island, City of[1]	NA	NA	NA	NA
Muckleshoot Indian Reservation	TBD	None	TBD	None
Newcastle, City of	TBD	None	None	None
Normandy Park, City of	June 28, 1974	October 31, 1975	November 2, 1977	August 5, 1980
North Bend, City of	May 17, 1974	May 7, 1976	August 1, 1984	None
Pacific, City of	June 28, 1974	December 26, 1975	December 2, 1980	None
Redmond, City of	March 22, 1974	July 9, 1976	February 1, 1979	January 19, 1982
Renton, City of	June 7, 1974	November 7, 1975	May 5, 1981	None
Sammamish, City of	November 18, 1999	None	None	None
SeaTac, City of	September 30, 1994	None	September 30, 1994	None
Seattle, City of	July 19, 1977	None	July 19, 1977	None
Shoreline, City of	None	None	None	None
Skykomish, Town of	February 14, 1975	None	July 2, 1981	None
Snoqualmie, City of	December 21, 1973	None	July 5, 1984	None
Tukwila, City of	May 24, 1974	September 13, 1977	August 3, 1981	None
Woodinville, City of	May 16, 1995	None	May 16, 1995	None
Yarrow Point, Town of[1]	NA	NA	NA	NA

[1] No Special Flood Hazard Areas Identified

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

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10.0 REVISION DESCRIPTIONS

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the Department of Land and Water Resources, 201 South Jackson Street, Suite 600, Seattle, Washington 98104-3855 and at the Department and Environmental Services, 900 Oaksdale Avenue Southwest, Renton, Washington 98057.

10.1 First Revision

The purpose of this revision is to update the corporate limits of the City of Bothell and to add floodplain information for Miller Creek that affects the unincorporated areas of King County, Washington (Reference 94), and

then incorporated Cities of Normandy Park (Reference 11) and SeaTac. Approximately 4 miles of Miller Creek were studied by detailed methods. The revised floodplain along North Creek shown within the City of Bothell is for information only.
For flood insurance purposes, refer to the separately published Flood Insurance Rate Map. Detailed information regarding this revision is presented throughout the main body of this FIS report.

The information for this restudy of Miller Creek supersedes the data presented in the previous Flood Insurance Study for King County, dated September 29, 1989 (Reference 94). The discharges used in this study of Miller Creek were revised to account for the effects of urbanization and operations of the newly constructed Lake Reba Detention Pond. This restudy was completed in September 1991.

10.2 Second Revision

This study was revised on May 16, 1995, to incorporate the results of an analysis of existing hydraulic studies that was performed for the Snoqualmie River in the vicinity of the City of Snoqualmie. The analysis was performed by nhc, the study contractor, for FEMA under Contract No. EMW-90-L-3134, as part of its Limited Map Maintenance Program, (LMMP).

In addition to the analysis for existing hydraulic studies that was performed for the Snoqualmie River, this revision also identifies that the mapping for King County has been prepared using digital data. Previously published Flood Insurance Rate Map data produced manually have been converted to vector digital data by a digitizing process. These vector data were fit to raster digital images of the USGS quadrangle maps of the county area to provide horizontal positioning.

Road, highway names, and centerline data have been obtained from an enhanced TIGER (Topologically Integrated Geographic Encoding and Referencing) File, obtained through the King County Computer and Communications Services Division. For county areas outside of the City of Seattle, the centerlines were modified to the positional accuracy of the USGS quadrangle maps, and the roads, highways, and street names, if needed, were taken from the Flood Insurance Rate Map panels, where appropriate. The adjusted centerline data were then computer plotted with the digitized floodplain data to produce the countywide Digital Flood Insurance Rate Map panels.

Several additional incorporated areas have been identified in this update. They are the Cities of Algona, Burien, Bothell, Federal Way, Hunts Point, Medina, Mercer Island, Woodinville, and Yarrow Point and the Town of Clyde Hill and Beaux Arts Village.

The LOMR issued on December 18, 1990, for the City of North Bend, to show the effects of more detailed hydrologic/hydraulic information along the Snoqualmie River, was included in this update. As a result of more detailed hydrologic/hydraulic information, the floodway was revised along the Snoqualmie River throughout the corporate limits of the City of North Bend.

The LOMR issued on May 13, 1992, for the unincorporated areas of King County, to show the effects of more detailed topographic information adjacent to the Sammamish River, was included in this update. As a result of the more detailed topographic information, the 1-percent-annual-chance floodplain boundary was revised to exclude the K & S Business Park from the 1-percent-annual-chance floodplain.

The LOMRs issued on April 28, 1994, for the City of Redmond and the unincorporated areas of King County, to show the effects of more detailed hydrologic/hydraulic information along Bear Creek, were included in this update. As a result of the more detailed hydrologic/hydraulic information, the Flood Insurance Rate Map was revised to modify elevations, floodplain and floodway boundary delineations, and zone designations along Bear Creek from its confluence with the Sammamish River to State Highway 202 (Redmond Way). In addition, a Flood Profile Panel was included for the Bear Creek Overflow Channel.

10.3 Third Revision

This study was revised on May 20, 1996, to incorporate the results of detailed hydrologic and hydraulic analyses of the Raging River affecting King County, Washington. The revised analyses for the reach of the Raging River from its confluence with the Snoqualmie River to approximately 0.6 mile upstream of Interstate Highway 90 (I-90) (downstream reach) were performed by Harper Righellis, Inc., Portland, Oregon, for the King County Surface Water Management Division. The revised analyses for the reach from approximately 0.6 mile upstream of I-90 to approximately 0.3 mile upstream of the second Upper Preston Road bridge (upstream reach) were performed by FEMA. This work was completed in March 1995. Detailed information regarding this revision is presented throughout the main body of this FIS report.

10.4 Fourth Revision

This study was revised on March 30, 1998, to incorporate the results of detailed hydrologic and hydraulic analyses of North Fork Issaquah Creek in the City of Issaquah, Bear and Evans Creeks in the City of Redmond, South Fork Skykomish River in the Town of Skykomish and the unincorporated areas of King County, and the Middle and North Fork Snoqualmie Rivers in the unincorporated areas of King County.

This study also incorporates the results of an approximate analysis of Tate Creek in the unincorporated areas of King County. Detailed information regarding this revision is presented throughout the main body of this FIS report.

10.5 Fifth Revision

This study was revised on November 8, 1999, to incorporate the Flood Insurance Study information and data for the City of Bothell into the Flood Insurance Study report for King County, Washington and Incorporated Areas. The City of Bothell is located in the Puget Sound region of northwestern Washington, approximately 3.5 miles northeast of the City of Seattle. The City of Bothell is a bi-county community within King and Snohomish Counties. Because the Flood Insurance Rate Map and Flood Insurance Study report for Snohomish County, Washington and Incorporated Areas is being published in a countywide format (Reference 118), the portions of the City of Bothell that lie within King County are included on the Flood Insurance Rate Map for King County, and the portions of the City of Bothell that lie within King County are included on the Flood Insurance Rate Map for King County, and the portions of the City of Bothell that lie within Snohomish County are included on the Flood Insurance Rate Map for Snohomish County. Detailed information regarding this revision is presented throughout the main body of this FIS report.

This study has also been revised to incorporate Letters of Map Revision (LOMRs) issued on March 3, 1995 (Case Nos. 94-10-053P and 94-10-067P), and July 5, 1995 (Case No. 95-10-41P). The March 3, 1995, LOMR revised Flood Insurance Rate Map Panel 0007 C, dated March 2, 1994, to show the effects of a private flood protection system along North Creek from just upstream of I-405 to just downstream of Monte Ville Parkway.

10.6 Sixth Revision

This study was revised on December 6, 2001, to incorporate the results of detailed hydrologic and hydraulic analyses of the Tolt River in the Town of Carnation and the unincorporated areas of King County; and the South Fork Snoqualmie River from I-90 to approximately 4,000 feet upstream of 468th Avenue. Detailed information regarding this revision is presented throughout the main body of this FIS report.

The restudy for the South Fork Snoqualmie River covers the mainstem of the Snoqualmie River from Meadowbrook Bridge to the confluence of the Middle and South Fork.
The hydraulic analysis of the South Fork Snoqualmie River upstream of I-90 was initially performed by Harper Righellis, Inc., Portland, Oregon, for the King County Surface Water Management Division. The data prepared by Harper Righellis were incorporated into the analysis performed by the USACE and revised where necessary.

The USACE restudy was requested because the USACE, Seattle District, determined that the levees on the South Fork do not meet FEMA's current standards for providing protection from the 1-percent-annual-chance flood.

10.7 Seventh Revision

This FIS was revised on April 19, 2005, to incorporate the results of revised hydraulic analysis of Snoqualmie River main stem, South Fork and Middle Fork of the Snoqualmie River, performed by Harper Houf Righellis Inc., completed in October 2001. This revision affects the Cities of North Bend and Snoqualmie, and the unincorporated areas of King County, Washington.

In addition, this revision will incorporate the results of a revised hydrologic and hydraulic analysis of Issaquah Creek, East Fork Issaquah Creek, and Gilman Boulevard Overflow of Issaquah Creek, performed by Montgomery Water Group Inc., completed in August 2001. This revision affects the City of Issaquah, and the unincorporated areas of King County, Washington.

This revision will incorporate the results of a revised hydraulic analysis of Tibbetts Creek performed by Concept Engineering, Inc. This revision affects the City of Issaquah, and the unincorporated areas of King County, Washington. Detailed information regarding this revision is presented throughout the main body of this FIS report.

Tibbetts Creek LOMR

The LOMR issued on February 23, 2005, for the City of Issaquah and the unincorporated areas of King County, to show the hydraulic effects of the channel relocation and fill along Tibbetts Creek, was included in this update. As a result of the channel relocation, fill and more detailed topographic information, the Flood Insurance Rate Map, Flood profiles, and Floodway Data tables were revised to modify elevations, floodway data, and floodplain and floodway boundary delineations along Tibbetts

Creek from approximately 150 feet upstream of I-90 (eastbound) to approximately 700 feet downstream of Newport Way Northwest.

10.8 Eighth Revision

This FIS was revised on {date to be determined}, to incorporate the results of revised hydraulic analysis of Cedar River, Paterson Creek, Snoqualmie River, and Springbrook Creek.

In addition, this revision converts all NGVD29 elevations to NAVD88. All elevations shown on the Flood Insurance Rate Map, Flood Profiles, and Floodway Data tables are referenced to NAVD88. Refer to section 3.3 Vertical Datum for a more detailed explanation of the datum conversion including datum conversion factors used for King County.

Cedar River Study - The purpose of this revision is to prepare a flood study of Cedar River. The revised floodplain and floodway maps will reflect the current hydraulic and hydrologic conditions of the rivers and will replace the effective maps which were prepared prior to the 1980s.

The hydrologic and hydraulic analyses for this study were prepared by nhc for the City of Renton. Agencies contacted for information relevant to this study included: the City of Renton, King County Department of Natural Resources-Water and Land Resources Division, and the United States Army Corps of Engineers-Seattle District (USACE).

This report describes an investigation of riverine flooding along the Cedar River within the city of Renton, Washington. The study reach begins at the river outlet at Lake Washington and extends 5.36 miles upstream to the Renton City Limits at 149th Avenue Southeast and extends to Landsburg Road crossing in the unincorporated area of the King County. The purpose of this study is to update the existing FEMA Flood Insurance Study (FIS) for King County, Washington and Incorporated Areas (FEMA, November 1999*)* to reflect current hydraulic conditions along the Cedar River using higher revised peak discharges and updated geometry

Kelsey Creek - The upstream limit of the Kelsey Creek study reach begins just upstream of the culvert crossing of NE 6th Street, west of 148th Avenue NE at Cross Section AQ. The floodplain both upstream and downstream of this crossing consists of a wide, undeveloped wetland area. Floodplain widths range from approximately 200 to 600 feet Downstream, Kelsey Creek crosses NE 8th Street through a culvert into Kelsey Creek Regional Pond 133, located northeast of the corner of 148th Avenue NE and NE 8th Street. Pond elevation and discharge are controlled by a weir/culvert structure located just downstream of Cross Section AO. Overtopping of the control structure is not expected during the 1-percent-annual-chance event, and the floodplain is confined to the vegetated corridor both upstream and downstream. Downstream, the floodplain remains within the channel corridor with widths varying from 30 to 65 ft. Flooding of low-lying areas of a few residential parcels upstream of the 148th Avenue NE culverts is expected, but water levels do not reach buildings or other structures. Overtopping the 148th Avenue NE roadway is not expected as it is substantially elevated.

Downstream of the 148th Avenue NE culverts, Kelsey Creek enters a steep, forested ravine-like corridor. Flooding is contained within the banks of the narrow channel with widths varying from 15 to 45 feet. This reach continues downstream for approximately 0.5 mile until it encounters a series of culverts at the Illahee Apartment Complex. Here, backwater caused by the driveway embankment and culvert group is expected to flood the floor level units on the right bank. Downstream of the Illahee Apartments to 140th Avenue NE, flooding is contained within the vegetated channel corridor. The confluence with the first major tributary to Kelsey Creek is Valley Creek. Overtopping of the 140th Avenue NE Bridge is not expected.

Downstream of 140th Avenue NE, Kelsey Creek flows adjacent to Bel-Red Road and commercial properties. Along this reach the stream is confined within a channelized corridor and is crossed by several driveway bridges. These bridges are elevated well above the computed 1-percent-annual-chance flood profile, thus they have no impact on flood levels. Floodplain widths range from 15 to 55 feet.

The Kelsey Creek diverges from Bel-Red Road, turns southwesterly, and enters a reach surrounded by office and apartment buildings. Several bridges and culverts located along the reach adequately convey flow with the exception of the office park driveway bridge; overtopping of this structure is expected during the 1-percent-annual-chance event. Flood levels are not expected to encroach on any structures in this reach as the floodplain remains relatively confined to the channel corridor with widths varying from 15 to 45 feet.

Continuing downstream, Kelsey Creek meanders through a winding, but still entrenched, vegetated corridor, flanked by residential parcels. The floodplain remains confined to the corridor with widths varying from 15 to 70 feet. Upstream of the NE 8th Street culvert, the floodplain expands over the right bank to inundate an adjacent pond area. Floodplain widths in this short reach range from 60 to 200 ft; however, nearby residential structures remain outside the inundation limits.

A grade control structure consisting of a series of concrete weirs is located immediately upstream of the NE 8th Street culvert (near 132nd Av NE). At this structure it was assumed flow would transition from sub-critical to super-critical, thus be critical, at the upstream crest of the structure.

Downstream of NE 8th Street, Kelsey Creek enters the Glendale Golf Course. Along the first 0.6 miles of this reach the channel is steep and entrenched. Several small pedestrian bridges cross the stream, but most are elevated above the computed flood profile thus they generally have no significant impact. In addition, there are several groups of concrete grade control structures located in the channel; these structures were modeled as inline weirs in the HEC-RAS model. Flooding along the Kelsey Creek golf course reach remains confined within the channel until where overtopping into the left bank floodplain begins as the channel gradient lessens and the channel becomes less entrenched. The floodplain expands over both the left and right banks with a floodplain width of approximately 200 feet.

Downstream of the Glendale Golf Course, Kelsey Creek enters the City of Bellevue's Kelsey Creek Park. Here, the floodplain abruptly transitions from well manicured fairways to a densely vegetated channel corridor. Furthermore, the right floodplain of Kelsey Creek is confined and divided by a pathway and earthen embankment structure from the adjacent swale to the west. As discussed in the previous sections, because these structures are not certified by FEMA, they were not considered to provide flood protection. As a result, it is assumed the embankment does not exist and thus have allowed water to overtop the natural right bank of Kelsey Creek, via lateral weirs, into the adjacent swale to the west. A separate flood profile was computed along the length of the swale feature. In addition, the area in between the swale and main channel of Kelsey Creek was designated as Zone X, because: 1) flooding depth is expected to be less than 1 foot; and 2) accurate BFE's could not be defined due to two-dimensional flow in the area.

Beyond the park, Kelsey Creek flows into an expansive wetland area that is confined by the Lake Hills Connector roadway embankment along the south and west boundaries. The confluence with the West Tributary is located about half way into the wetland, and the confluence with Richards Creek occurs further downstream near. Flooding in this area is primarily controlled by a series of culvert/roadway embankments at the Lake Hills Connector and 121st Avenue SE. Overtopping is not expected along 121st Avenue SE or the southbound lanes of the Lake Hills Connector, but floodwaters are expected to overtop the northbound lanes of the Lake Hills Connector. The BFE of floodwaters upstream of the Lake Hills Connector are nearly constant at an elevation of approximately 32.5 ft, NAVD 88. At this elevation, overflow of SE 7th Place (north and east of Lake Hills Connector) into a wetland area to the north of SE 7th Place is expected, but does not contribute conveyance area to the system.

Shallow flooding of the northbound lanes of the Lake Hills Connector may also occur along the left bank. At the 1-percent-annual-chance level, flooding over the Lake Hills Connector may be on the order of 1 foot deep and overtopping flows will likely discharge over the roadway to the southwest into Richards Creek. A preliminary HEC-RAS model included lateral weirs to route flow into Richards Creek, but the resulting flow depths were not significantly changed. To accurately define the 1-percent-annual-chance hazard area and BFEs over this portion of the Lake Hills Connector, the effective FIS of Richards Creek, i.e. hydraulic model, may need to be reevaluated. At this time the 1-percent-annual-chance flood hazard area over the Lake Hills Connector has been designated a shaded Zone X (shallow flooding).

Downstream of the southbound lanes of Lake Hills Connector, flooding is confined to the wide, wetland corridor, with widths ranging from 200 to 740 f1. Further downstream, at the 121st Avenue SE culverts, Kelsey Creek again becomes entrenched. Flooding here is confined to a vegetated corridor as it passes under the Wilburton Railroad Trestle and finally to the I-405 culverts. Flooding on the order of 12 ft deep is computed upstream of the I-405 culvert, but is well confined by the elevated freeway and adjacent hillsides.

West Tributary of Kelsey Creek - The West Tributary study reach begins at the northernmost boundary of the Glendale Golf Course. Minor flooding of the left and right bank floodplains occurs along the upper reach, but downstream of the flow expands significantly with widths up to 430 f1. Several small bridges located in the golf course reach of the West Tributary obstruct flow and thus contribute to flooding.

Downstream of the golf course, the West Tributary enters Kelsey Creek Park. Flooding in the upper portion of the park is related to the constriction caused by the north parking lot and bridge. Here, flooding is generally contained within the wetland to the north of the parking lot, but some shallow flooding of the lot itself is expected. Downstream of the parking lot, the West Tributary splits with a channel to the west, and a swale-like feature that flows directly south. Although at the l-percent-annual-chance level the area between the channels is expected to remain dry, it was modeled as single reach because the cross section density and orientations were sufficient to compute reasonable profiles.

Further downstream, the West Tributary crosses two pedestrian bridges and elevated pathways. Flood levels in this portion of the park are generally controlled by these structures with a uniform floodplain width of approximately 300 feet.

Downstream of Kelsey Creek Park, the West Tributary flows through a densely vegetated corridor and into the wetland and finally joins the main stem of Kelsey Creek. Flow in this area is likely very two-dimensional as the West Tributary expands overbank into the wetland.

The 1-percent-annual-chance floodway boundaries developed in this study were determined with the HEC-RAS model, with the general assumption of equal conveyance reduction from each side of the floodplain (HEC-RAS method 4). At a few locations, applying the automatic encroachment feature available in HEC-RAS produced flood elevation increases greater than 1 foot and resulted in an unusual floodway shape. As a result, the encroachments were manually adjusted (HEC-RAS method 1) until a reasonable floodway was established. At many cross sections the floodway boundaries coincide with the top of the channel banks, yet a 1-foot rise is not achieved at these sections. As required by FEMA, the floodway cannot encroach into the active channel; therefore, the rise is limited to something less than 1 foot. However, for mapping purposes, in locations where the floodplain is contained within the active channel banks the floodway is coincident with the floodplain boundary.

Floodway widths were computed at each cross section. Between sections, the floodway boundaries were estimated by first attempting to maintain a relatively uniform width, then adjusting the boundaries to include or exclude topographic features that have a significant effect on flow conveyance.

Patterson Creek - The purpose of this revision is to prepare a flood study of Patterson Creek. The revised floodplain and floodway maps will reflect the current hydraulic and hydrologic conditions of the rivers and will replace the effective maps which were prepared prior to the 1980s.

This study was completed by nhc under contract to King County Department of Natural Resources and Parks (KCDNRP). The County is a Cooperating Technical Partner (CTP) with the Federal Emergency Management Agency (FEMA) for purposes of conducting flood insurance studies. King County provided project management and technical review of all study products. The County also supplied relevant study data including hydrometric data for the Patterson Creek watershed and information on past watershed flooding.

Lower Snoqualmie River Study - The purpose of this revision is to update the lower Snoqualmie River. The revised floodplain and floodway maps will reflect the current hydraulic and hydrologic conditions of the rivers and will replace the effective maps which were prepared prior to the 1980s.

This study was completed for FEMA at the request of King County. The County served as Cooperating Technical Partners (CTP), providing relevant study data, first-hand information on the watersheds and associated flooding issues, and technical review of all study products. King County also served in the role of Project Manager and contracted with nhc to provide technical analyses for the FIS updates.

Springbrook Creek Study - The purpose of this revision is to update Spingbrook Creek between the Black River Pump Station (BRPS) and SW 43rd Street (also referred to as South 180th Street). The revised floodplain and floodway maps will reflect the current hydraulic and hydrologic conditions of the rivers and will replace the effective maps which were prepared prior to the 1980's.

The hydraulic and hydrologic analyses for this study were conducted following the approach described in an earlier memorandum by nhc. This approach was reviewed and approved by the FEMA Map Coordination Contractor in a letter to the City of Renton, dated September 25, 2002. Continuous hydrologic simulation modeling for a 53 year period of record (October 1, 1948 through September 30, 2002) was used to identify and adjust storm inflow hydrographs to Springbrook that correspond to recurrence intervals required for unsteady flow hydraulic modeling and subsequent floodplain mapping. Two types of potential flood generating peak events were identified for hydraulic analysis: a Storage Scenario, which includes events that produce very high water surface elevation at the Black River Pump Station due to pumping restrictions caused by high flows in the Green River, and a Conveyance Scenario which includes events that exhibit maximum peak flows into the pump station forebay. This study was completed in June 2006.

Green River Study – The Green River floodplain was redelineated from Cross Section N through just upstream of Cross Section CE based on the Green River (Without Levee) regulatory base flood water surface elevations in the King County FIS. The without levee flood water surface elevations were compared to the surrounding topography assuming that levees and levee-type structures would not prohibit water from leaving the river channel. One exception was that the Tukwila 205 levee was considered to provide protection from flooding. Topography data from 2006 was used to perform the comparison. In locations where the 1- and 0.2-percent-annual-chance boundaries coincide, only the 1-percent-annual-chance boundary has been delineated on the maps. This includes nearly the entire overbank area where the 1- and 0.2-percent-annual-chance floodplains would coincide since maximum water levels in the levee failure scenarios are controlled by the latter half of the flow hydrograph (in the modeling, these areas take several days to reach equilibrium conditions) and flows for this portion of the 1- and 0.2-percent-annual-chance hydrographs for the Lower Green River are the same due to the regulation provided at the USACE's Howard A Hanson Dam. In general, the floodway was developed to coincide with the effective Green River floodway to the greatest extent possible. The HEC-RAS model was run to determine if the effective floodway could fully contain the 1-percent-annual-chance flood without causing surcharges in excess of 1 foot relative to the "fail all levee" condition. In areas where the 1-foot surcharge could not be achieved, the overbank portions of the floodway were delineated using the FLO-2D model. Encroachments in the overbank areas were manually defined until a reasonable floodway boundary was established.

Floodway widths were computed at each cross section in the HEC-RAS model and the delineation between sections was drawn based on topographic information. At some cross sections, the floodway boundary coincides with the top of the channel banks. The floodway does not encroach into the channel and the floodway along the certified levee near Southcenter (i.e. the Tukwila 205 Levee) was delineated along the landward toe of the levee fill. Floodway data is not provided for portions of the floodway that were analyzed using FLO-2D.

In locations where the floodway and the 1-percent-annual-chance floodplain boundary coincide, only the floodway boundary is shown on the map.

Middle Green River –A Regulatory Floodway was delineated for the Middle Green River using the HEC-RAS model. In general, the floodway was developed using Encroachment Method 4 in HEC-RAS. In locations where the floodway and the 1-percent-annual-chance floodplain boundary coincide, only the floodway boundary is shown on the maps.

Method 4 automatically computes encroachment stations by attempting to achieve a predefined surcharge (1 foot) while targeting an equal loss of conveyance on each overbank, if possible. At some locations, applying the automated encroachment computation produced surcharges significantly different from 1 foot and/or resulted in an unreasonable floodway shape. As a result, encroachments in some locations were manually adjusted using HEC-RAS Method 1 until a reasonable floodway boundary was established. At some cross sections, the floodway boundary coincides with the top of the channel banks and the floodway does not encroach into the active channel.

Floodway widths were computed at each cross section. Between sections, the floodway boundary was interpolated based on topographic information and to reflect assumed flood flow characteristics.

The Mill Creek floodway and storage floodway were preserved and shown on the map. Additionally, the floodway from the Springbrook Creek restudy was shown on the map. Otherwise, Green River floodplain inundation of the Mill and Springbrook Creeks floodplains was shown. The Green River floodplain was shown as an AE-Zone with BFEs.

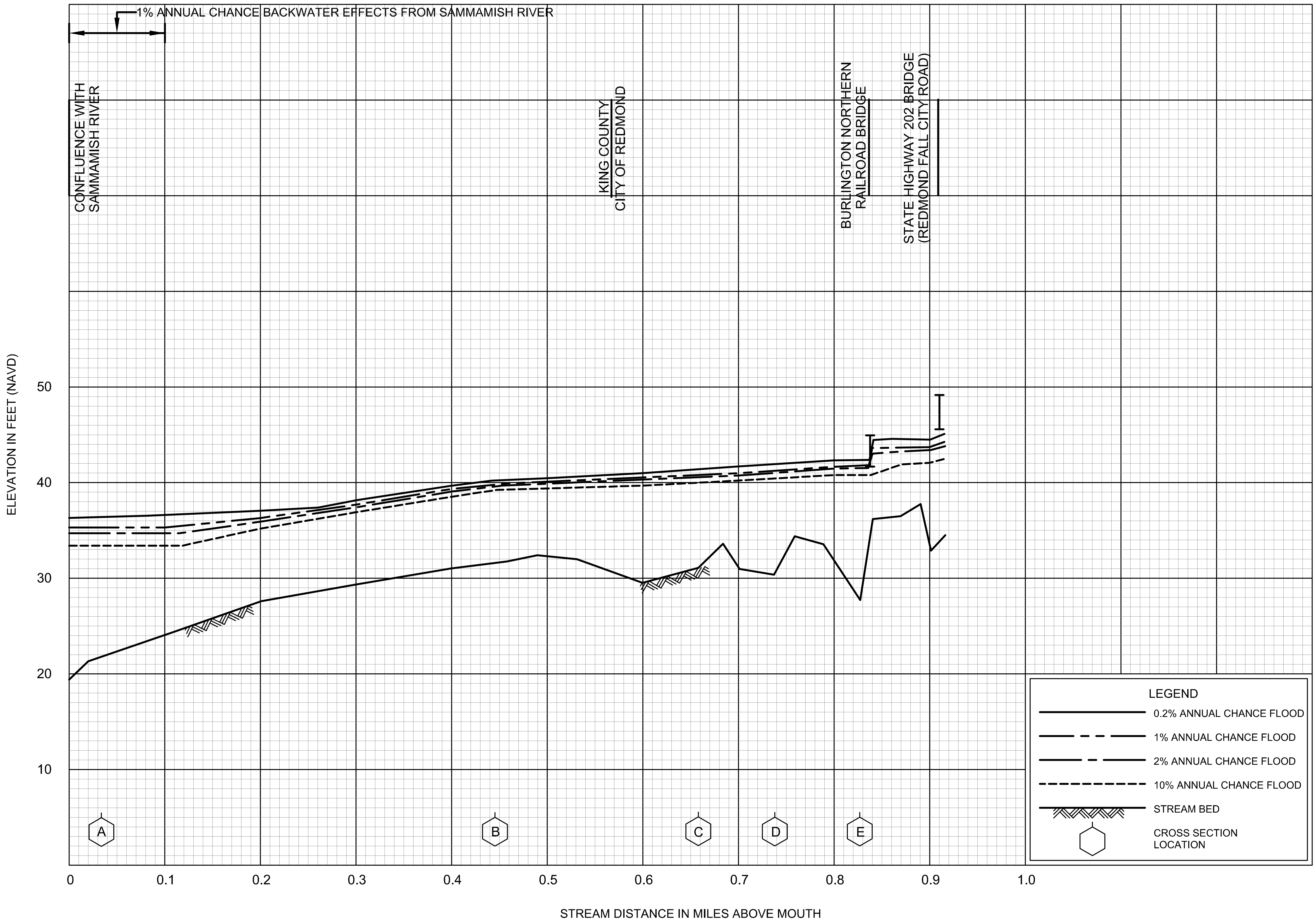
10.9 Ninth Revision

This FIS was revised on **To Be Determined**, to incorporate the results of revised hydraulic analysis of Sammamish River, and White River and the coastal analysis from Puget Sound.

Puget Sound-The purpose of this project was to develop up-to-date and accurate coastal flood hazard analyses for incorporated areas of King County, Washington along the entire coastline of Puget Sound. This study was conducted using FEMA's Guidelines for Coastal Flood Hazard Analysis and Mapping for the Pacific Coast of the United States (Pacific Coast Guidelines (FEMA, 2005). As one of the first studies to use the new guidelines for the Pacific Coast, this project also serves as a case study for implementing the methods and recommendations outlined in the Pacific Coast Guidelines. The products of this study will be submitted to FEMA to be integrated into FEMA's County-wide DFIRM for King County.

Sammamish River-The purpose of this project was to prepare a flood study of the Sammamish River that can be submitted to FEMA to initiate a revision to the published FIRMs and FIS for both Incorporated and Unincorporated Areas of King County in the State of Washington. The revised floodplain and floodway maps reflect the current hydraulic and hydrologic conditions of the Sammamish River and will replace the effective maps which were prepared in 1978.

White River - The purpose of this project was to prepare a flood study of the White River that can be submitted to FEMA to initiate a revision to the published FIRMs and FIS for Unincorporated Areas of King County in the State of Washington. The revised floodplain and floodway maps reflect the current hydraulic and hydrologic conditions of the White River and will replace the effective maps which were prepared in the 1980s.



FLOOD PROFILES

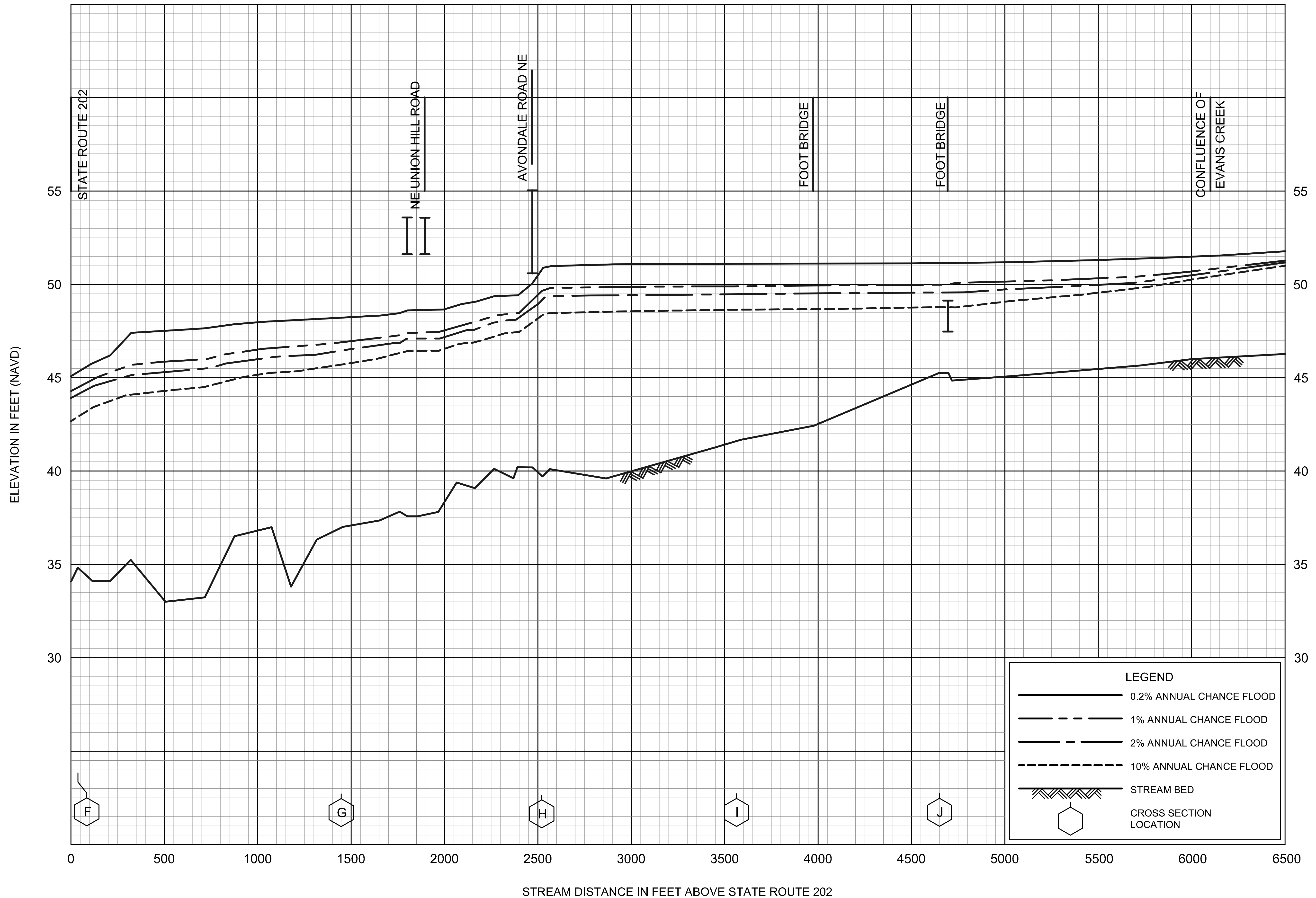
BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

01P



FLOOD PROFILES

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KING COUNTY, WA

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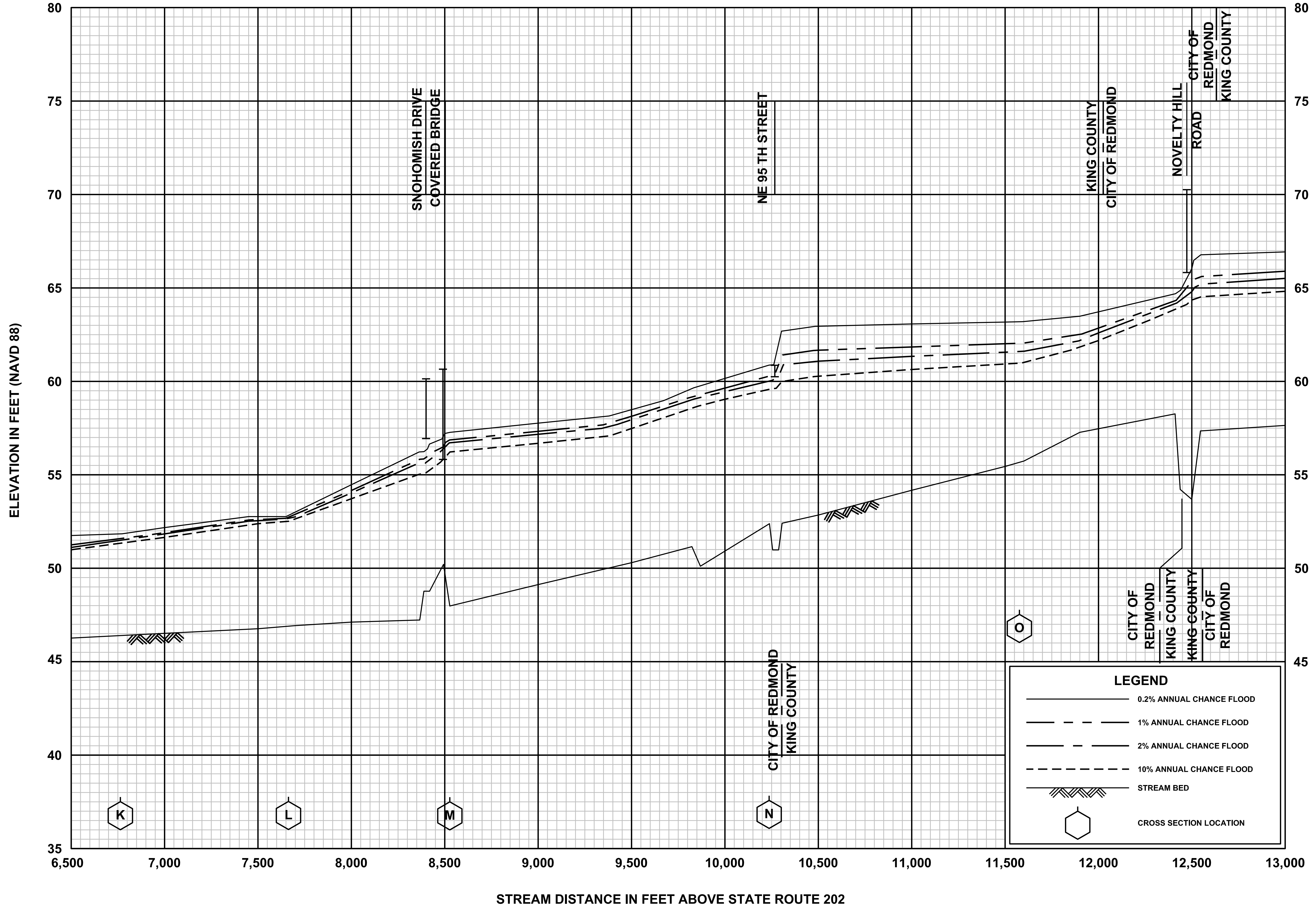

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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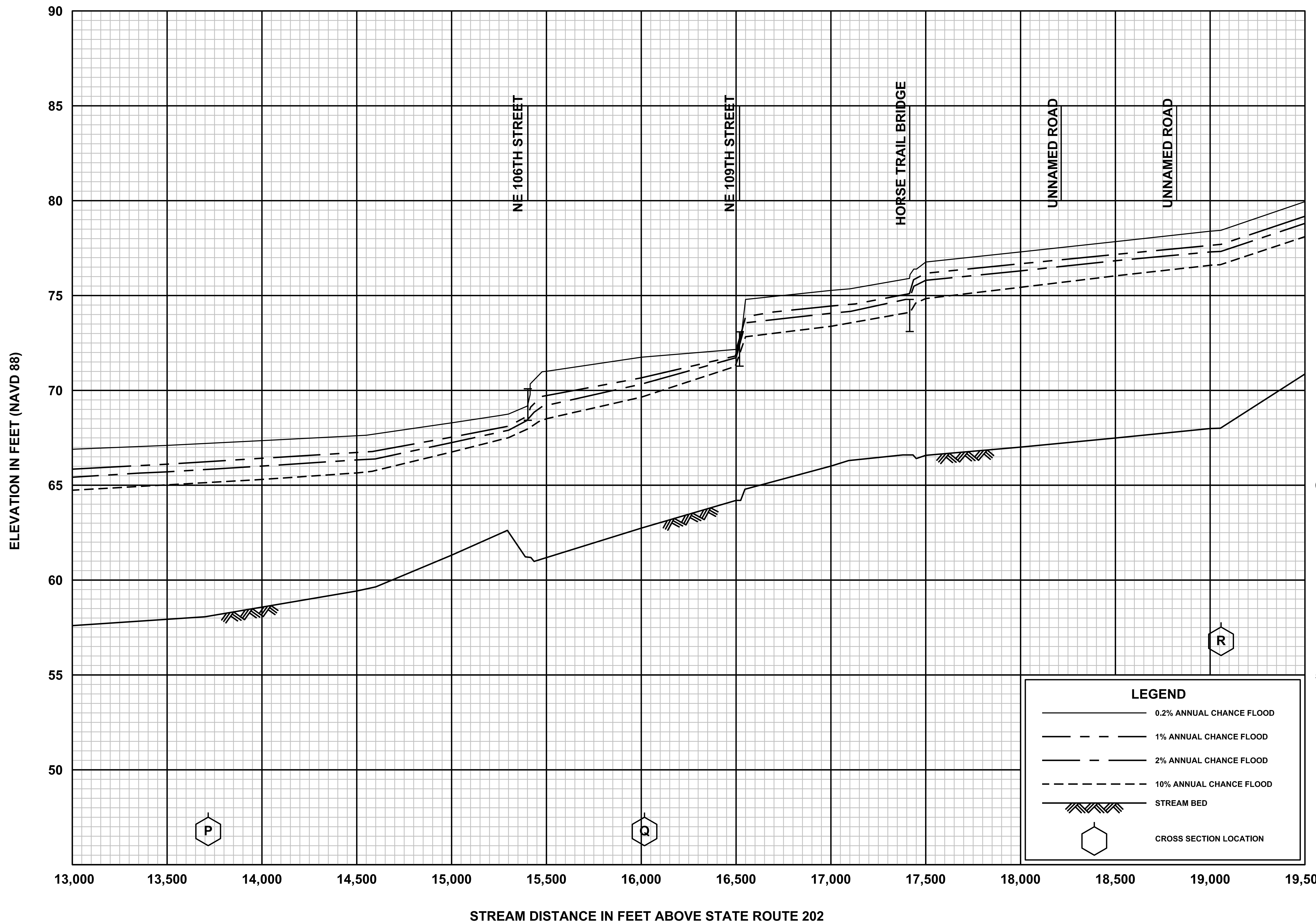

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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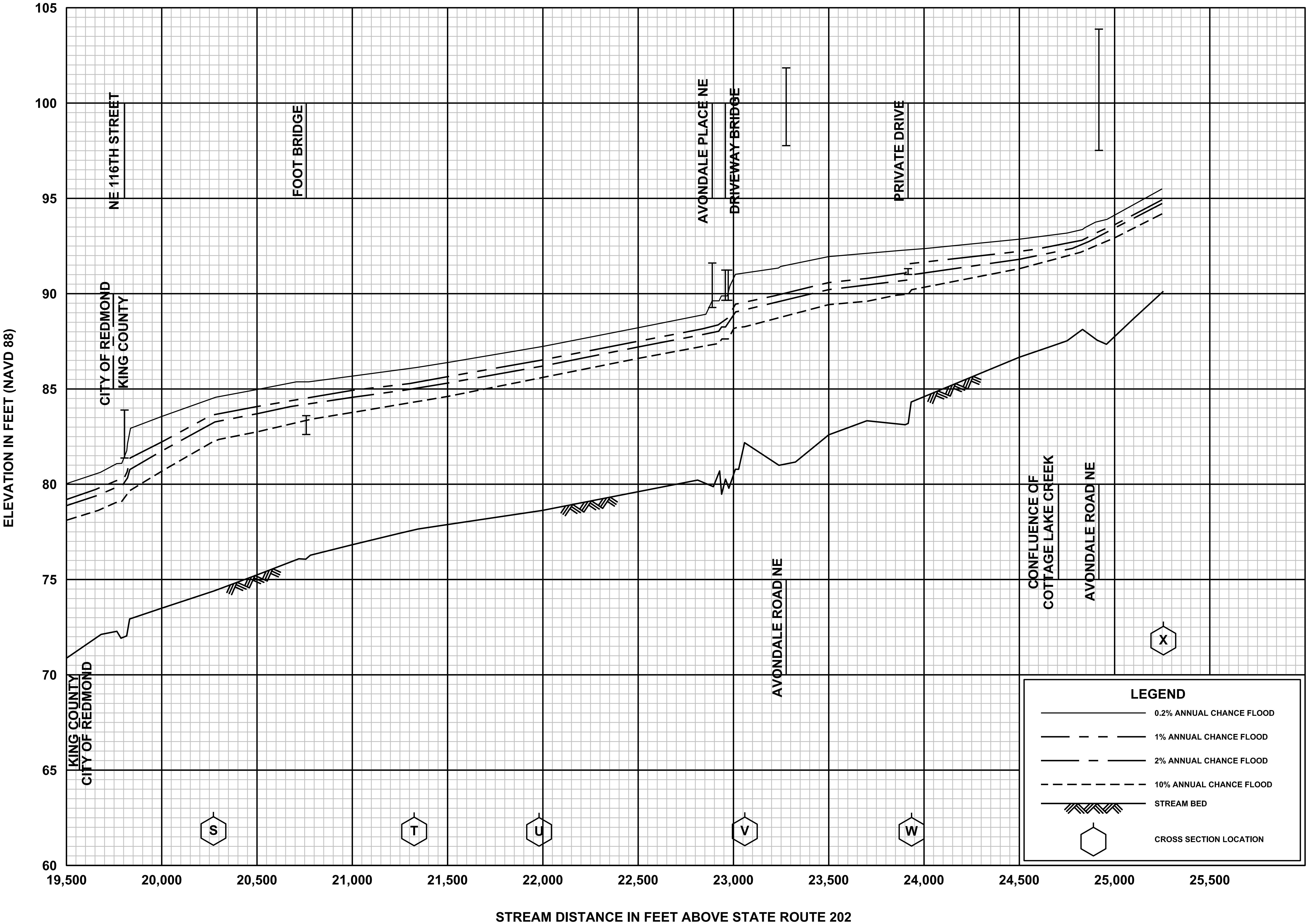

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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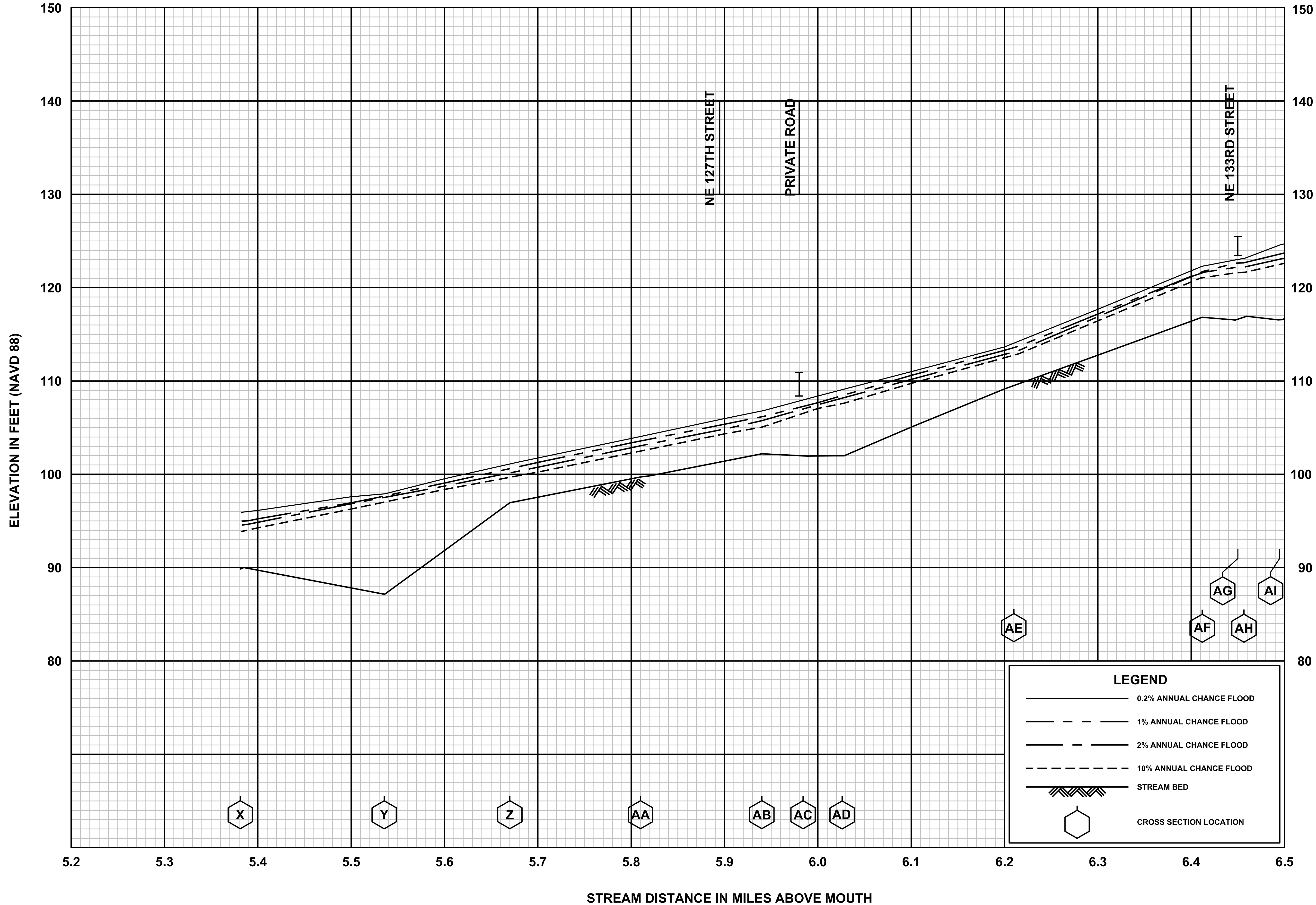

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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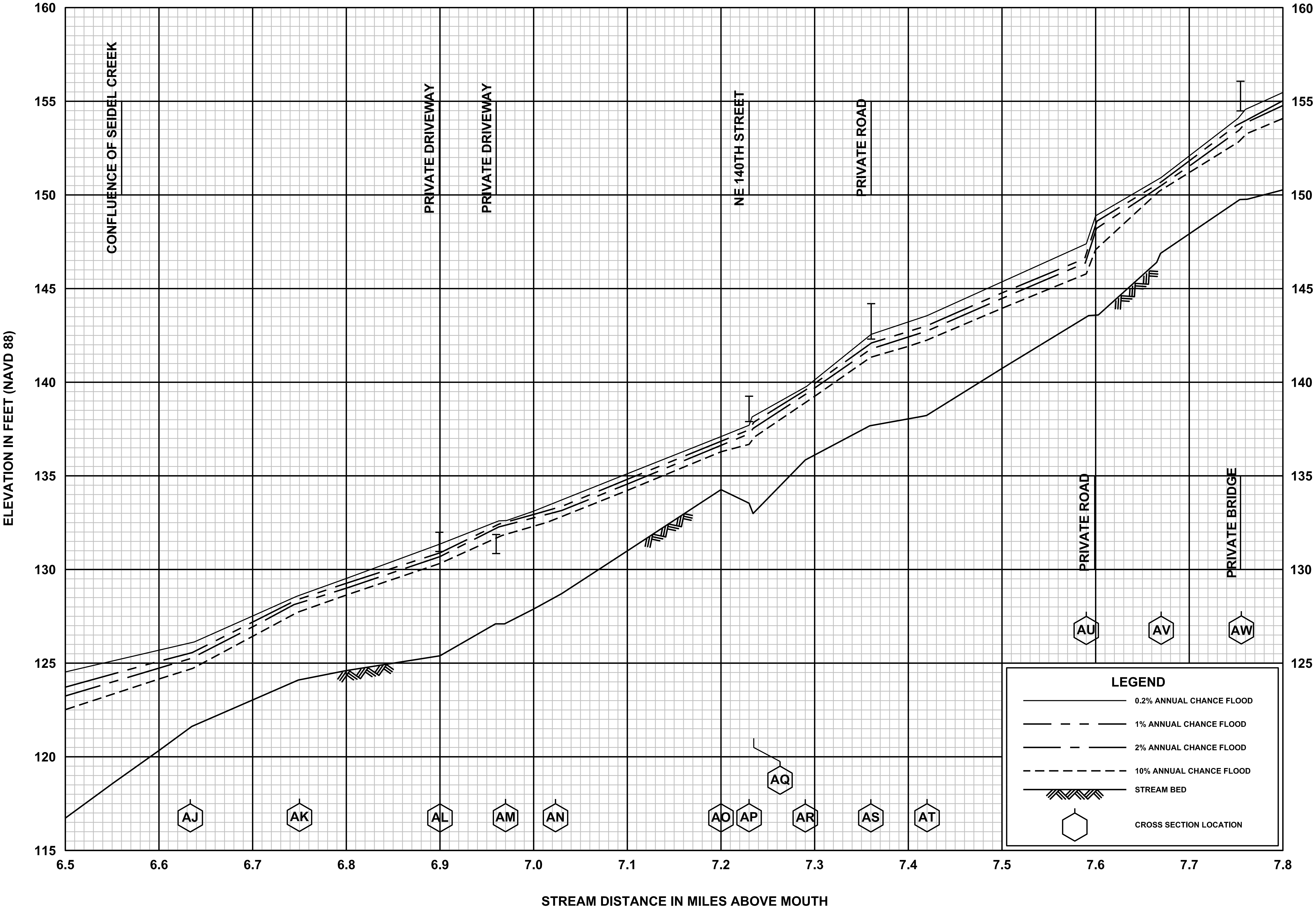

FLOOD PROFILES

BEAR CREEK

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KING COUNTY, WA

AND INCORPORATED AREAS

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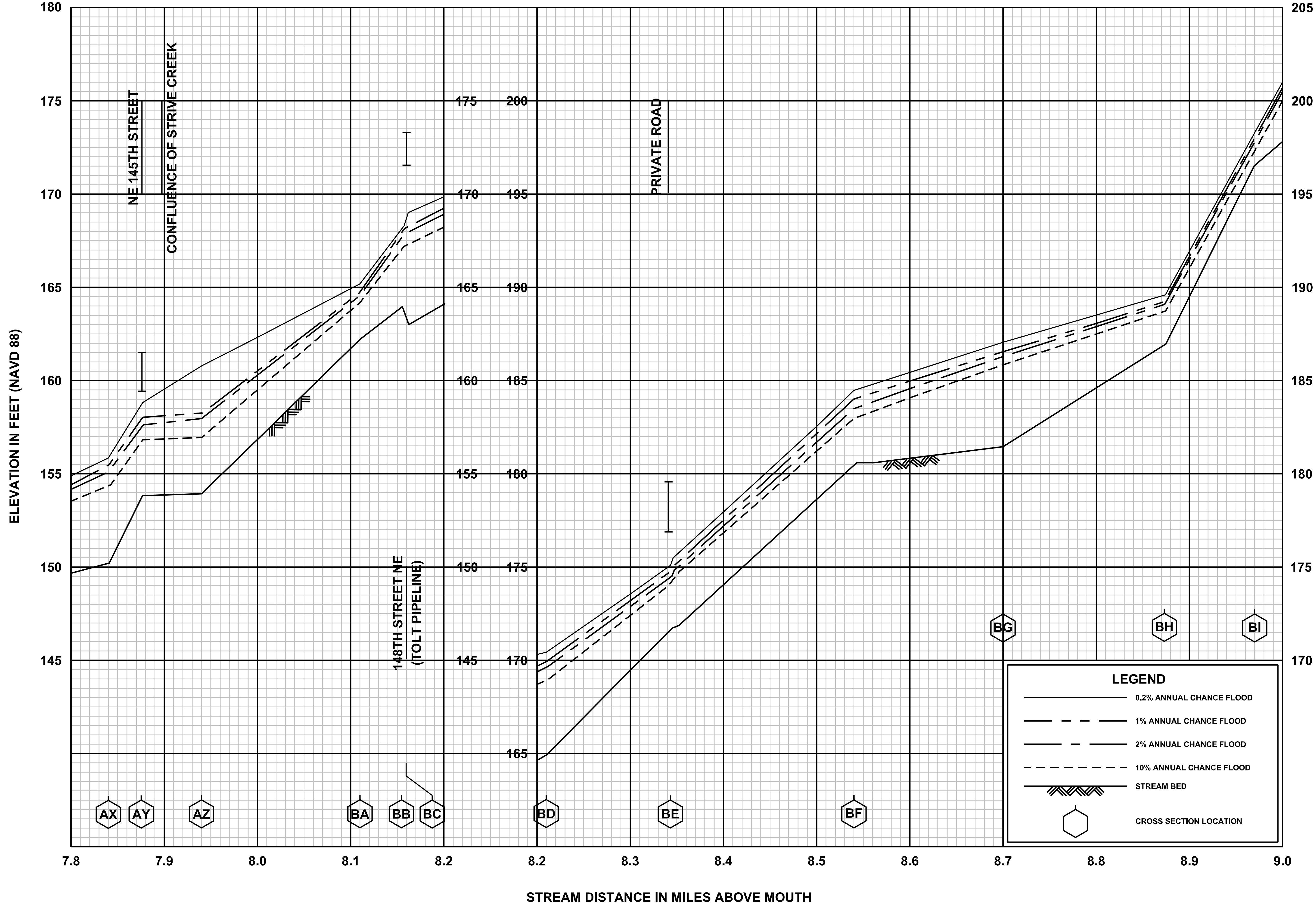

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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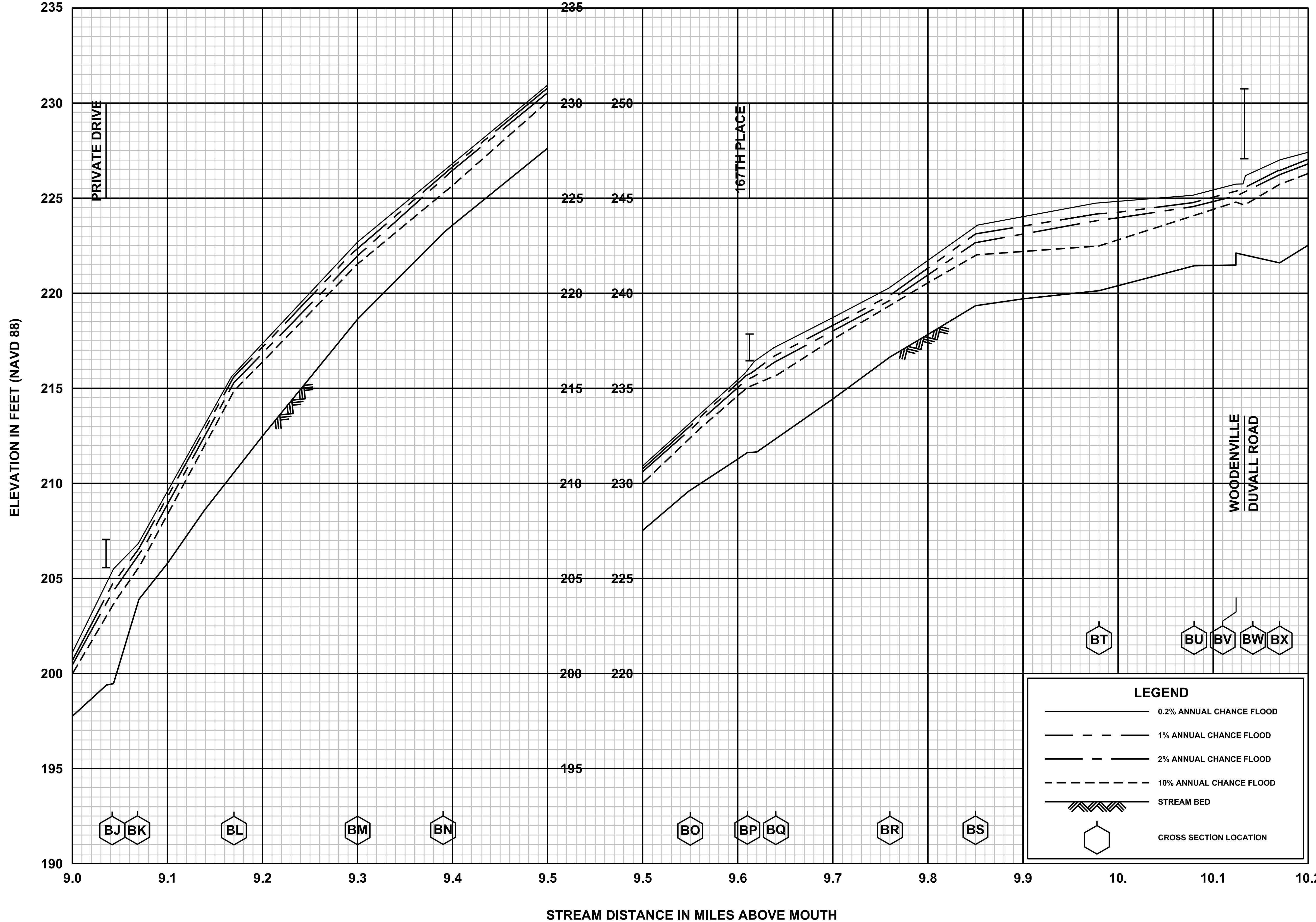

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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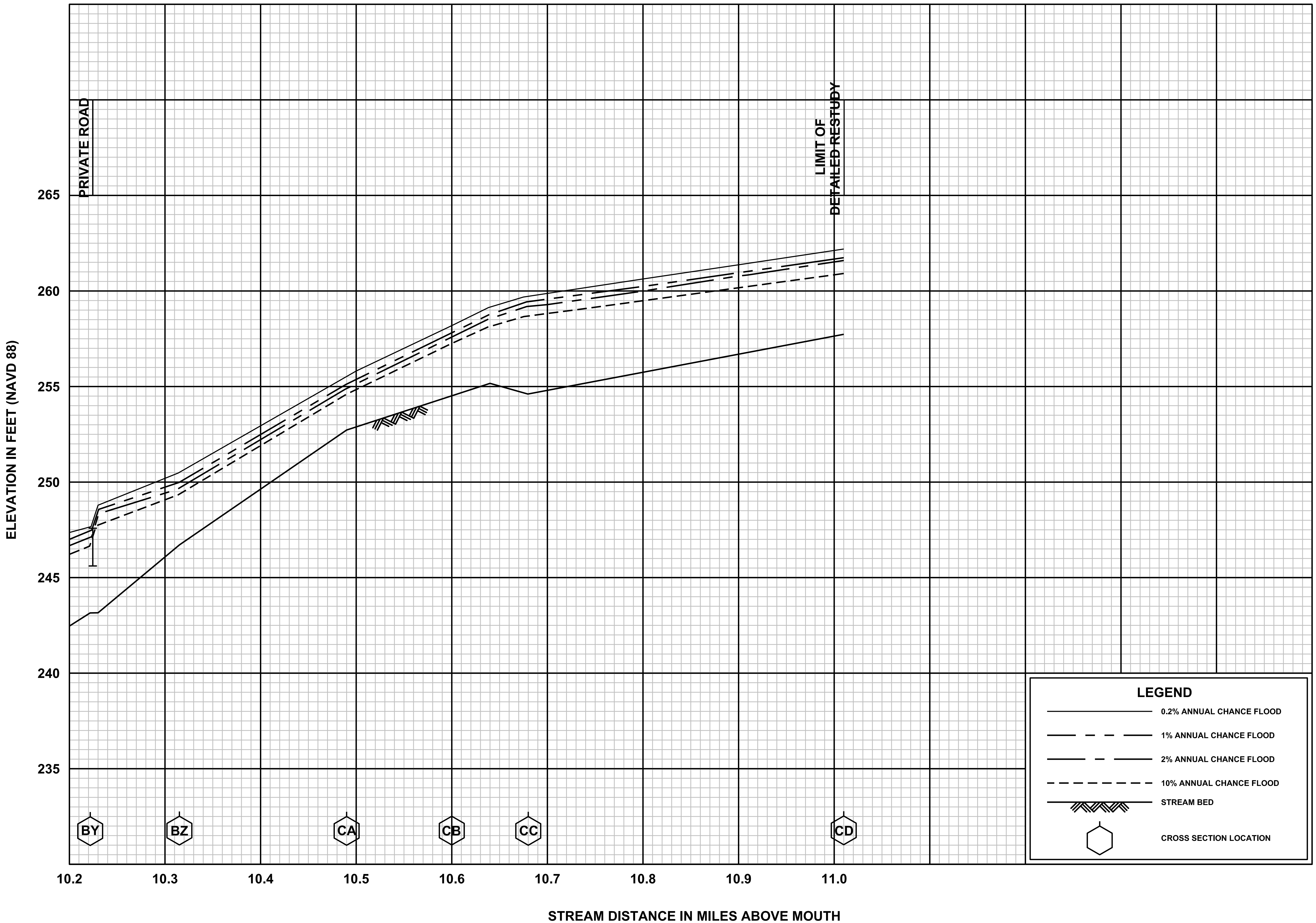


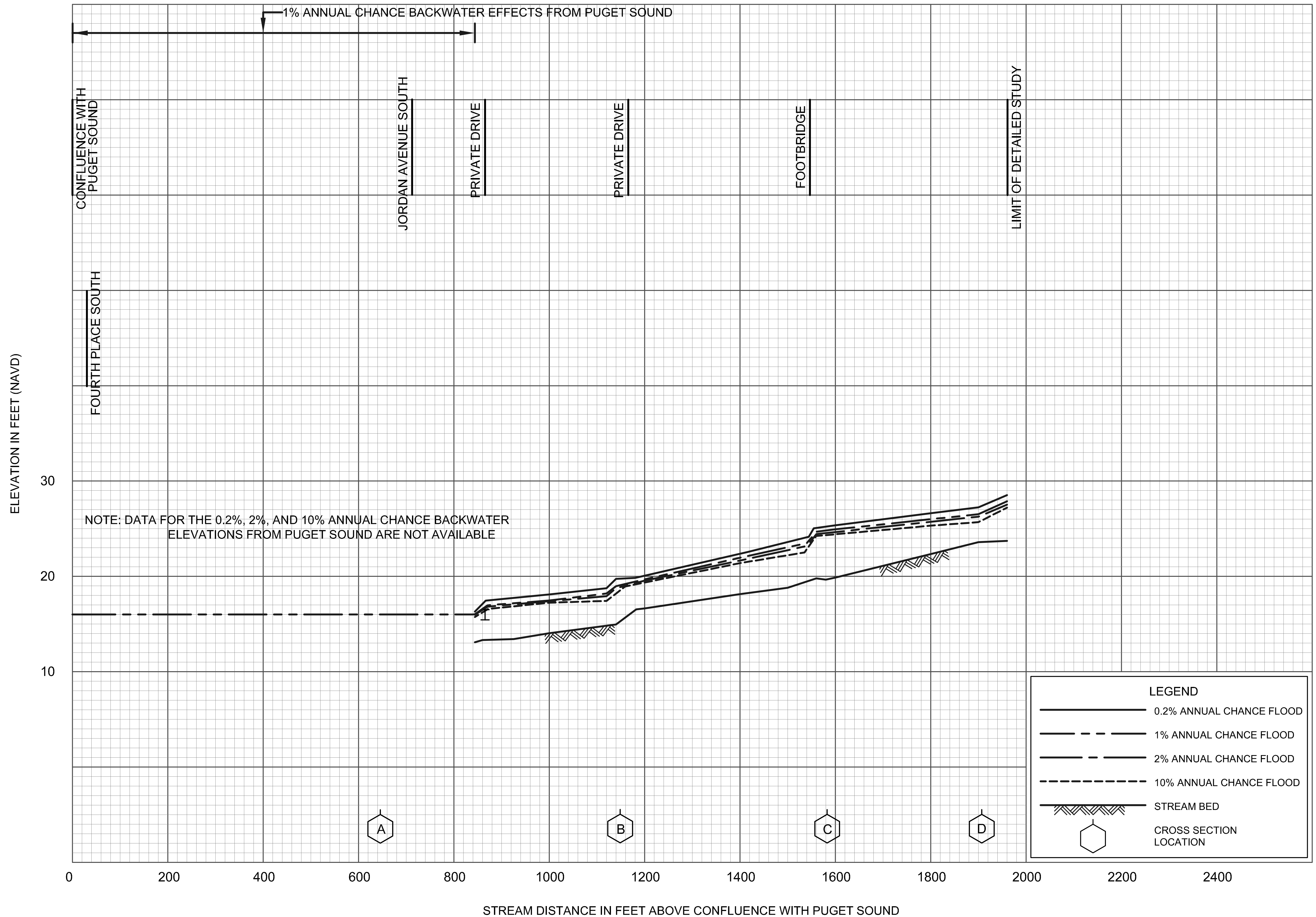
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS



FLOOD PROFILES

DES MOINES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

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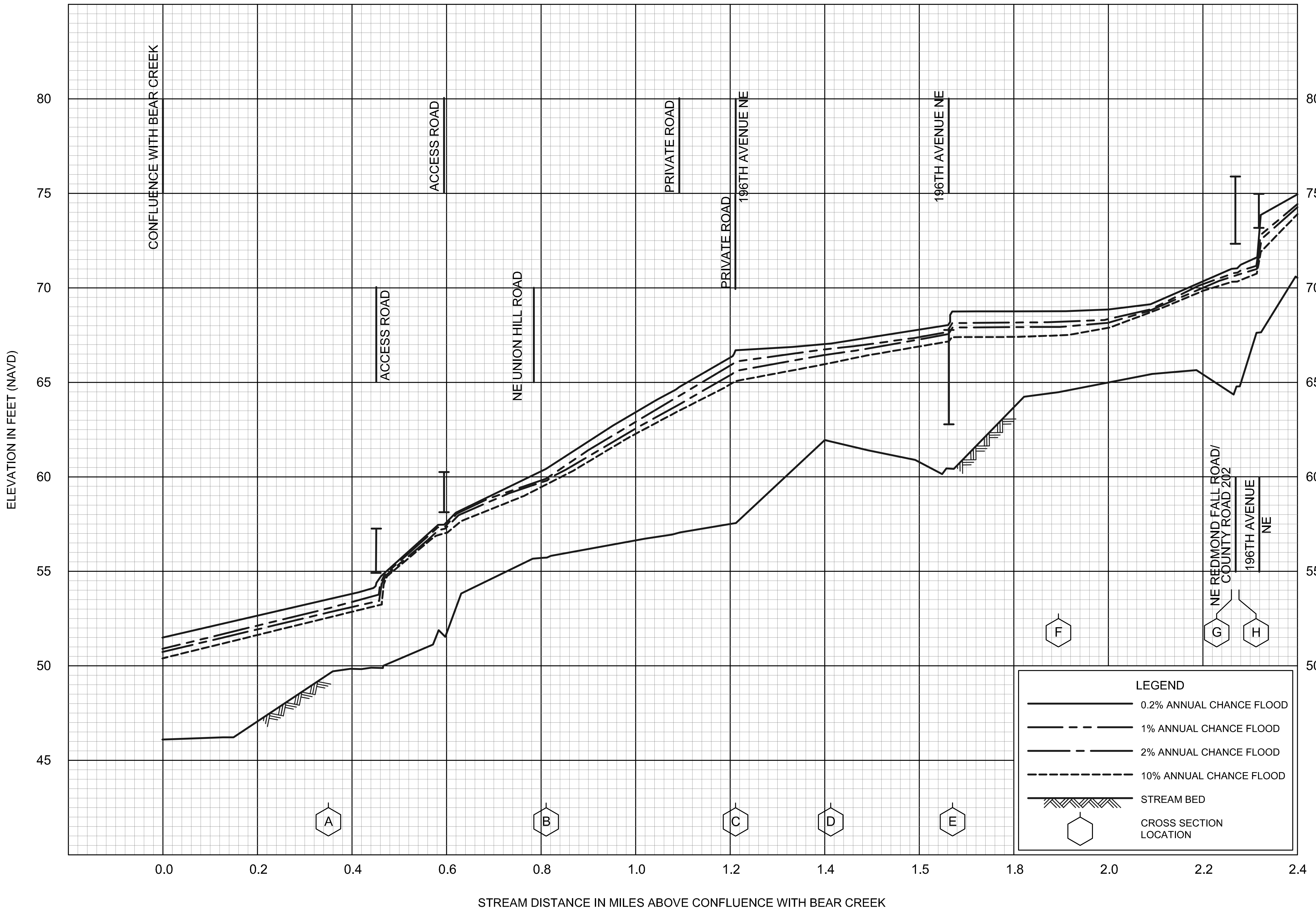

FLOOD PROFILES

EVANS CREEK

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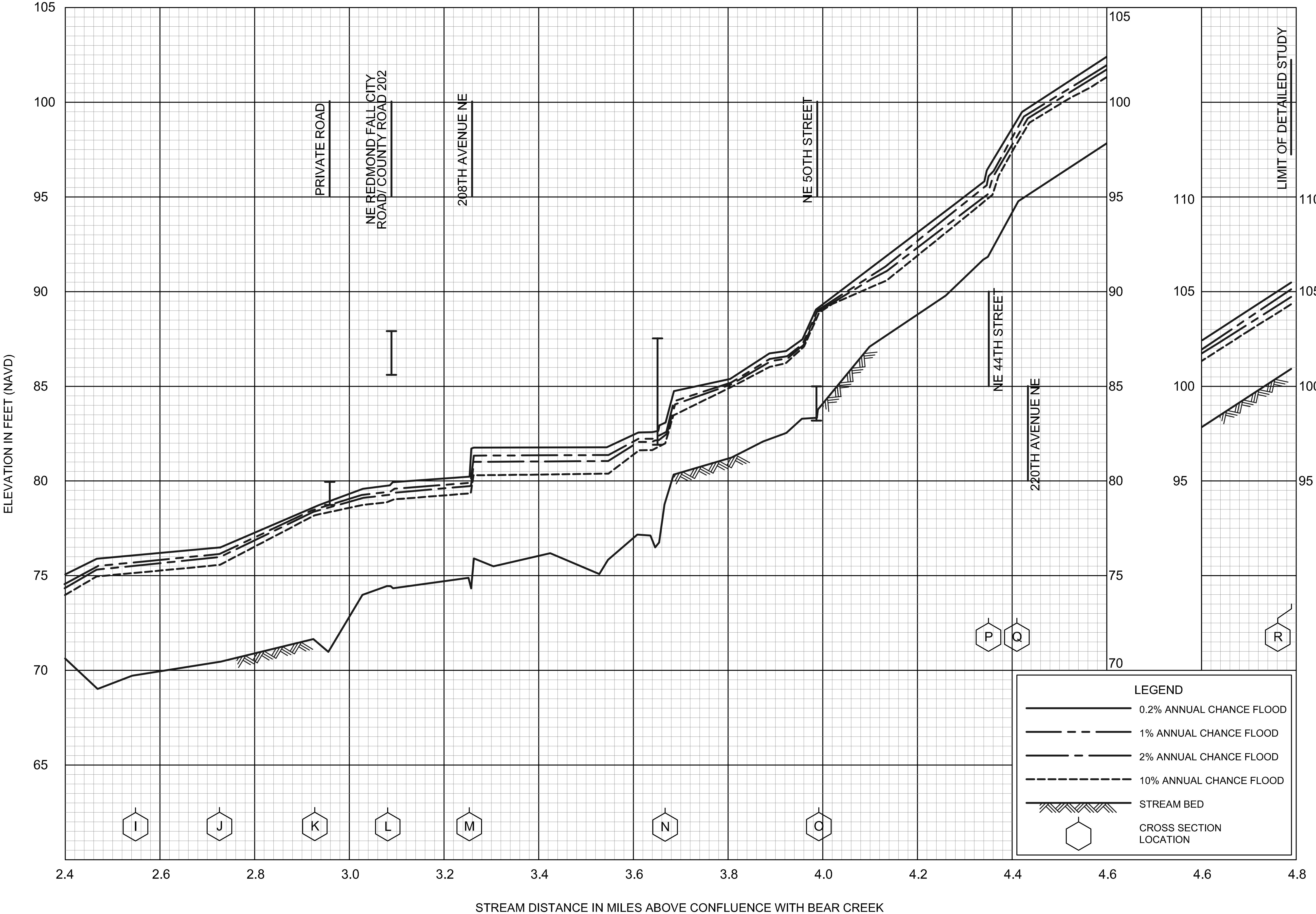
KING COUNTY, WA

AND INCORPORATED AREAS



FLOOD PROFILES

EVANS CREEK

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